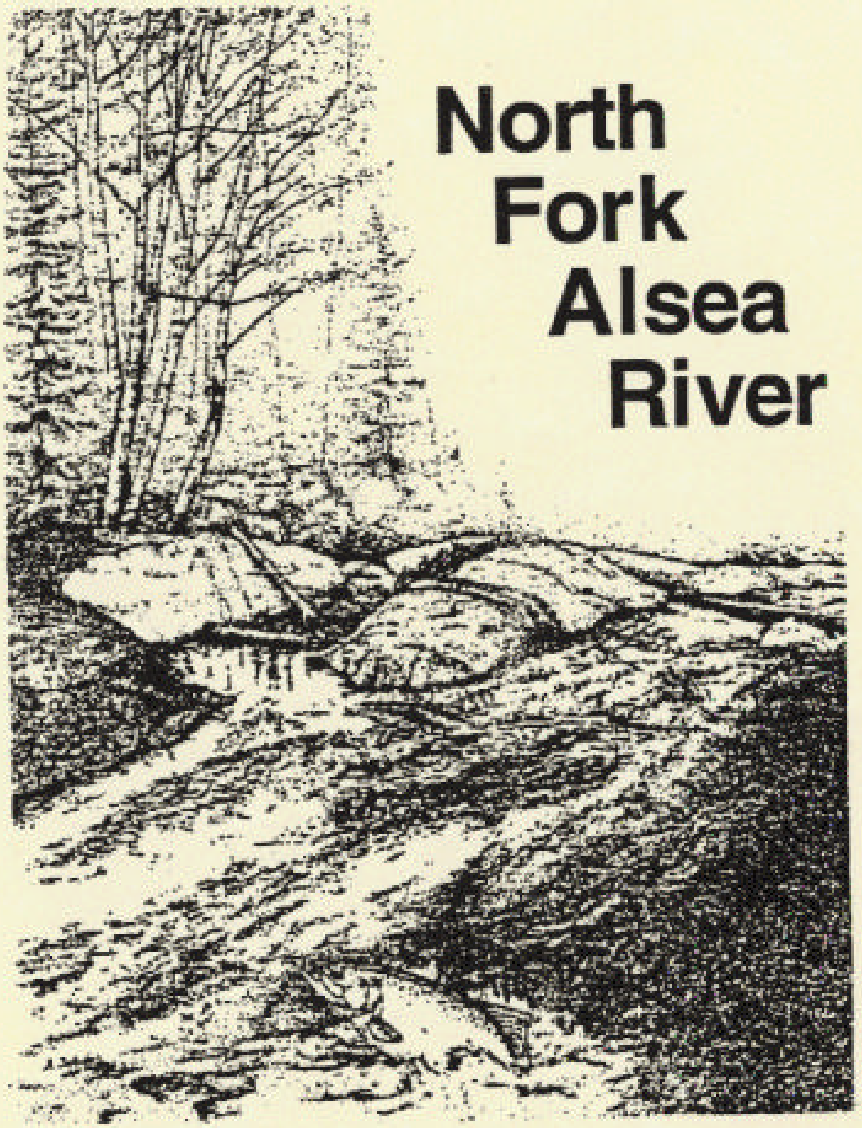
Watershed Analysis

North Fork Alsea River



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North Fork Alsea Watershed Analysis

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The analysis portion of this project was done in the Spring and Summer, 1995. A first draft of the documentation was completed in the Fall of 1995, however workload priorities prohibited the completion of this final document until now. No attempt has been made to update the information, process or format to correspond with the recently released Federal Guide for Watershed Analysis (Version 2.2, August 1995). This is a iterative document and will be updated periodically as new information becomes available. The data in this document was the best available at the time the analysis was made. Management opportunities for this watershed must be considered in light of the checkerboard land ownership pattern of BLM-administered lands and the recently completed Late Successional Reserve (LSR) Assessment (USDA, SNF, USDI, BLM, 1996) for LSR's 0268 and 0267. Cooperative programs with adjacent ownerships are necessary to achieve optimum results in restoration opportunities for this watershed.

Watershed analysis is a ongoing, iterative and evolving process used to characterize the human, aquatic and terrestrial features, conditions, processes, and interactions within a watershed. It provides a systematic way to understand and organize ecosystem information. In doing so, watershed analysis enhances our ability to estimate direct, indirect and cumulative effects of our management activities within a watershed. Watershed analyses will be the mechanism to support ecosystem management at approximately the 20 to 200 square mile watershed level.

Watershed analysis is <u>not</u> a decision-making process; rather, it is a stage-setting process. The results and recommendations of watershed analysis establish the context for subsequent decision-making processes, including planning, project development, and regulatory compliance on Federal lands. The watershed analysis process is not intended, nor will it be used, to dictate, influence, or judge management direction on non-federally owned land.

Watershed analysis of Federally-owned lands is required by the April 1994 *Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (ROD), and the "*Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern* Spotted Owl" (S&G). Within this analysis, the term "Northwest Forest Plan" (NFP) is used to denote the document which contains the ROD and S&G. The *Salem District Record of Decision and Resource Management Plan* (RMP) describes watershed analysis (page 71) as one of the principal means to be used to meet ecosystem management objectives.

A major step in the watershed analysis process is the identification of "Issues" that are relevant to the management of Federal lands in the North Fork Alsea watershed. These Issues were used to develop "Key Questions" which focus and drive the analysis of particular types and locations of cause-and-effect relationships, and discern conditions as they relate to values, uses and key ecosystem components and processes.

In this watershed analysis, the Issues and Key Questions have been logically grouped into three "Domains:" Human, Aquatic, and Terrestrial. The Human domain encompasses commodity forest products, transportation and recreation, the Aquatic domain looks at hydrology, riparian areas, fisheries and aquatic habitat, and the Terrestrial domain analyzes the vegetation, soils, and wildlife species and habitat. While there is considerable overlap and interaction among the various ecosystem components and processes in a natural system, these broad categories serve as an organizational aid to facilitate analysis of complex systems.

On a broad scale, much of the future condition of the North Fork Alsea watershed was decided in the NFP. The analysis stratified the watershed into four "Zones of Influence" which are defined by vegetation cover and geomorphology, and have also identified watershed specific opportunities and recommendations designed to achieve the goals of the NFP (see Chapter 6, "Recommendations"). Whereas the utility of the Domains was to help guide the team through the analysis, the utility of stratifying the watershed into Zones of Influence is to help facilitate resource managers when implementing management activities.

Within each Domain, the team arrived at, significant findings that are worthy of mention and will have a bearing on future management activities. The following is a partial list of those findings:

Human Domain

1) 1996 Flood Damage: an incomplete inventory of the transportation system reveals that immediate corrective action should be taken to mitigate further resource damage and salvage capital investments.

2) OHV and motorcycle use has been increasing in the southeast portion of the watershed. Erosion and other environmental problems exist, and user and landowner conflicts have occurred.

Aquatic Domain

1) Most of the watershed's matrix lands are found in the Early Logging Zone, from a "reference perspective," this is also the zone that provided the most significant spawning and summer rearing habitat for coho and steelhead.

2) The water quality in the Rugged Zone is at high risk for negative cumulative effects due to high road density.

Terrestrial Domain

1) Late-successional and old-growth forests represent only 17.8% of the watershed, and past management patterns have left most of these stands in a highly fragmented condition.

2) Grass Mountain and Mary's Peak represent significant blocks of Late-successional and old-growth forest habitat. Land exchanges and/or density management projects in the corridor between these two areas offers the most immediate and substantial benefit to enhancing the condition of late-successional forests in this watershed.

A prioritized list of additional recommendations by Domain and Zone of Influence for the entire watershed can be found in Chapter 6.

The intended audience of this document is Bureau of Land Management and Forest Service resource managers and was written accordingly. However, since there is a large amount of interest in this area by the general public, the team attempted to include an adequate amount of information in the text and the appendices for those seeking additional clarity.

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Chapter I - Characterization

Introduction

This chapter provides a brief “snapshot” of the North Fork Alsea River Watershed[1] to allow the reader to form a mental image of what the watershed looks like today. In addition, this information attempts to give a very brief historical perspective to explain how the watershed came to be the way it is. The North Fork Alsea River Watershed is one in which the BLM manages a relatively high percentage (almost 50%) of the land base. When industrial forest lands are added to public lands, including the U. S. Forest Service’s, the figure for managed forest area in the watershed reaches 90%; only a narrow stretch of farm and other private land in the southern part of the watershed (along Highway 34) and a few scattered balds and other patches are unforested.

The *Assessment Report: Federal Lands in and Adjacent to the Oregon Coast Province* (Siuslaw National Forest, July 1995) states that 64% of the Alsea River Basin is in federal ownership, totaling 281,000 acres, the highest federal ownership of all the north coast basins. This basin has been designated as a high priority for restoration in the *State 1 Watershed Assessment Final Report* (Oregon Division of State Lands, December 1994), and using the Bradbury Process (*Handbook for Prioritizing Native Salmon and Watershed Protection and Restoration: Draft Report* [The Pacific Rivers Council, April 1995]), it also is rated as a high priority for restoration. In light of these reports, restoration efforts in the basin, logically planned and implemented, could provide considerable benefits.

Location & Size

The North Fork Alsea River Watershed is located in the central Coast Range (Coast Range Province) of western Oregon. It is approximately 17 miles southwest of Corvallis, and 26 miles east of the Pacific Ocean. Roughly 73% of the watershed is in Benton County; the remainder is in Lincoln County. The watershed is about 9 miles wide both east to west and north to south. A major tributary of the Alsea River, the North Fork Alsea River has a watershed of just under 41,900 acres (see Appendix 1, Map 1). After traveling some 15 miles, the North Fork Alsea joins the South Fork a few hundred yards west of the town of Alsea to form the mainstem Alsea River, which flows into Alsea Bay at Waldport.

Topography

The terrain is generally mountainous, with steeply incised ridges. The highest point is Mary’s Peak (4,097 feet above sea level), and going clockwise from it, the boundary of the watershed contains several dispersed mountains: Old Dobler (1,550 feet), Flat Mountain (2,600 feet), Grass Mountain (3,990 ft.) and Rocky Point (1,750 ft.). The bottomlands, which are mostly farms, are only "about a mile long and never more than a quarter-mile wide" until the North Fork begins to flow westward where “the valley floor broadens to about half a mile.” (Reynolds, 1993).

Climate & Precipitation

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1 [1] Abbreviated as N. F. Alsea

The Alsea Basin has a marine-influenced climate, typical of the coastal area of Oregon. Winters are cool and wet, summers are warm and dry, and precipitation falls primarily as rain. In most years, snow remains for short periods of time at elevations above 1,500 feet, and is subject to rain-on-snow events. Also at higher elevations, precipitation intensities can be expected to exceed 5 inches in 24 hours roughly every two years.

Vegetation

The North Fork Alsea River Watershed lies within the Western Hemlock Vegetation Zone, named for the climax species which eventually dominates the forested plant community. Douglas-fir is currently the dominant tree species within the watershed because it is a long-lived species which regenerated after historic wildfires. Major disturbances such as wildfires, windstorms, landslides, floods, insects, pathogens and human activity determine the successional pathways within the landscape. As a result of these disturbances, each plant community within the watershed has vegetation that occurs over a range of successional stages. Of the 20,081 acres of BLM managed forest lands in the watershed, approximately 12,000 acres are planted plantations and 8,000 acres are natural stands.

Wildlife

Wildlife diversity within the watershed is quite typical for this region of the coast range. There are at least a few hundred vertebrate species and perhaps several thousand invertebrate species which utilize this watershed. The northern spotted owl, marbled murrelet, and bald eagle are known to occur in the watershed for at least some portions of the year.

Streams

The watershed includes about 515 miles of 1st to 6th order streams of which the BLM manages approximately 232 miles. The North Fork Alsea River has its head at Klickitat Lake in the northwestern corner of the watershed at approximately 1,200 feet elevation; it joins the South Fork at an elevation of approximately 300 feet. Wild populations of coho, fall and summer chinook, steelhead, rainbow trout, sea-run cutthroat trout, sculpin and dace are present within the watershed. A fish hatchery, operated since 1934 by the Oregon Department of Fish and Wildlife (ODFW), is located on the mainstem of the North Fork Alsea river, and contributes salmon, steelhead and trout to the fishery.

Subwatersheds and “Zones of Influence”

To expedite analysis of its condition, the North Fork watershed was divided into eleven sub-watersheds: Upper Crooked Creek, Crooked Creek Frontal, Easter Creek, Honey Grove Creek, Upper North Fork Alsea River, Lower North Fork Alsea River, Parker Creek, Racks Creek, Ryder Creek, Seely Creek and Yew Creek. These sub-watersheds were further grouped into four “zones of influence” which are based on vegetation cover and geomorphology: Early Logging, Valley, Rugged and Upper Basin (Appendix 1, Map 2).

Timber Harvest & Management

Timber harvest in the watershed began around the turn of the century, but the first significant timber management began in the 1950s and 1960s when significant areas of mature and old-growth timber were harvested in the drainage. During this time, most of the old-growth in riparian zones was also removed. Harvested lands are generally characterized by healthy and rapidly growing, even-aged Douglas-fir stands. Alternative species usually do not exist in these stands; snags, defective trees, and downed wood are largely absent or greatly limited in extent.

Forest management activities and the associated roads have had a significant effect upon the character of the stands within the watershed and the ecosystem of the larger landscape. Forest harvesting has left a fragmented landscape made up of several different seral stages; many of the patches are second-growth conifers, but there are also areas of shrub/grass-forbs, young conifers, hardwoods, and mixed stands, some mature and old-growth conifers, all in a variety of patch sizes. The spatial distribution of these various seral stages is not uniform throughout the watershed and is heavily dependent upon several factors including fire history and past management. Red alder and bigleaf maple often dominate along streams and rivers within the watershed.

Ownership

There are 41,868 acres within the watershed, reflecting the following ownerships (see Appendix 1, Map 3):

BLM - about 48% (20,081 acres: 17,827 of O & C land, 2,254 of public domain)
Private industrial forest landowners - 38% (15,885 acres)
U. S. Forest Service - 3% (1,182 acres)
Residential properties - the remaining 11% (4,718 acres).

The residential properties consist of the town of Alsea (population ca. 300), and rural agricultural land. Outside of Alsea, residences are generally scattered along the Highway 34 corridor which bisects the southeast corner of the watershed. Probably fewer than 1,000 persons reside with the boundaries of the watershed (Benton County Rural Development Plan, 1994).

Federal and private ownerships are intermingled; the Forest Service land (Siuslaw National Forest) is on or near Mary’s Peak in the northeast portion of the watershed. The majority of the non-agricultural private land in the watershed is managed for timber production by Willamette Industries and Starker Forests Inc.

Federal Land Use Allocations

Note: This section summarizes very briefly information found in the *Salem District Resource Management Plan* (RMP), *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (commonly called the "Northwest Forest Plan"), and the "Aquatic Conservation Strategy" (Appendix A of the Northwest Forest Plan). Readers familiar with these documents may wish to skim or skip this section altogether.

The RMP allocates BLM-administered land to specific purposes and establishes management actions/ direction for each allocation. The RMP incorporates all of the relevant decisions made in the Northwest Forest Plan. The land allocations and management actions and direction in the RMP provide the basic management guidance for this watershed analysis area.

All federal lands within this watershed fall into one of two categories: Late-Successional Reserves (LSRs) or General Forest Management Areas (GFMAs, or "Matrix"). Table 1.1 shows the extent of these major land use allocations in the watershed.

Table 1.1: Land Use Allocations

Allocations	BLM Acres	USFS Acres	Totals
LSRs	15,388	1,182	16,571
Matrix (GFMA)	4,694	0	4,694
Totals	20,083	1,182	21,265

Riparian Reserves ("buffers") have been identified within the LSRs and Matrix lands according to the hierarchy established in the Northwest Forest Plan. Within the N. F. Alsea Watershed, some 13,389 acres (67%) of BLM lands have been identified as Riparian Reserves; this figure will likely increase as additional intermittent streams are located in the field.

Also within the major BLM land allocations are sites and areas which have been allocated for specific purposes. For example, roads are allocated for present and future transportation of commodities, visitors, residents, and other land owners/managers. Unless they are closed for watershed restoration or other purposes, they will remain open and available for vehicular use. As other examples, BLM-administered land on Mary's Peak is allocated as a special recreation management area while other lands are allocated to visual resource management classes. Recreation development activities which meet LSR and Aquatic Conservation Strategy objectives will be undertaken as budgets allow.

Management actions and/or direction for the major land allocations of the N. F. Alsea Watershed are summarized as follows (additional discussion can be found in Chapter 5; details can be found in the RMP):

(1) LSRs will be managed to retain or reestablish, develop, maintain and enhance a functional, interacting late-successional and old-growth forest ecosystem that contributes to healthy wildlife populations. Density management in stands less than 80 years of age and other appropriate management activities may be undertaken to achieve Late-Successional Reserve objectives.

(2) GFMAs (Matrix) will be managed for the production of a stable supply of timber and other forest commodities, maintenance of important ecological functions, and provision of habitat for a variety of organisms associated with early successional forests. However, a legacy of the previous forest will be left in harvested units (I. e., green tree retention, snags and down woody material).

(3) Riparian Reserves will be managed to support Aquatic Conservation Strategy objectives and provide habitat for special status species and record of decision special attention species.

Resource Programs

This section summarizes the major resource programs and management actions/directions for BLM-administered land in the North Fork Alsea River Watershed. (See the RMP for additional details.)

Wildlife, Threatened and Endangered (and other Special Status) Species Habitat will be managed in a manner that protects species (and their habitats) that are federally listed or proposed for federal listing. Further, all lands will be managed in a manner that avoids contributing to the need to formally list federal candidate species, Supplemental Environmental Impact Statement (SEIS) special attention species, state (ODFW) listed species, BLM sensitive species and BLM assessment species.

Special areas will be managed to maintain, protect, and/or restore their relevant and important values. Such special areas include areas of critical environmental concern (ACECs), outstanding natural areas (ONAs), research natural areas (RNAs), and environmental education areas (EEAs).

Visual areas will be managed in accordance with the objectives of the four management classes stated in the RMP.

Stream, riparian zones, water quality, and fish habitat will be managed so that activities which retard or prevent attainment of the Aquatic Conservation Strategy objectives will be prohibited or regulated. Through watershed analysis, watershed restoration projects will be planned and implemented to aid in the recovery of fish habitat, riparian habitat and water quality.

Recreation sites, trails, and special recreation management areas will be managed to enhance visitor recreation experiences and produce satisfied public land users.

Chapter II - Issues and Key Questions

Introduction

This chapter identifies the specific issues that are relevant to managing BLM land in the North Fork Alsea River Watershed. These issues were used to develop key questions which focus the analysis on particular types and locations of cause-and-effect relationships, and discern conditions as they relate to values, uses and key ecosystem components and processes of the watershed.

A variety of sources provided insight into the values and uses which lead to the issues for this watershed analysis. They include recent analysis documents such as the Northwest Forest Plan on a regional level, and the Pacific Rivers Council study of the Alsea River on a basin level. Interactions with Alsea area residents, landowners, and interested individuals, and discussions with state and federal personnel and agency resource specialists also helped to identify issues and key questions.

The issues and key questions have been grouped into three domains: Aquatic, Terrestrial and Human. While there is considerable overlap and interaction among the various ecosystem components and processes in a natural system, these broad categories serve as an organizational aid to facilitate analysis of complex systems.

Human Domain

Commodity Forest Products

Issues

Historically the federal forest lands within the watershed were managed primarily for timber production. Local economies sustained themselves on the employment and revenue that was generated by the area's supply of timber. Under the Northwest Forest Plan, emphasis is placed on the restoration and maintenance of aquatic resources and late-successional forest habitat.

Key Questions

* What traditional and/or experimental management practices, including silvicultural, will be necessary to attain the conditions desired for each LUA?

* What level of timber and Special Forest Products production can be sustained for the next 10-20 years while still supporting the goals set for other resource values?

Transportation Management

Issues

To facilitate timber harvest, extensive road systems were developed throughout the watershed. Early construction standards for roads and bridges have left legacies that in some cases contribute to adverse environmental conditions. Reciprocal rights-of-way agreements with industrial forest landowners will require continued maintenance and use of certain road systems, and new construction on others.

Key Questions

* How will the current and projected regulations and uses of roads influence the management of the transportation system in the watershed?

* Do the conditions of roads in the watershed meet future needs of the transportation system?

Recreation

Issues

Historically, dispersed recreation such as fishing, hunting and berry picking were the primary recreational uses throughout the watershed. Currently there is a designated recreational area on top of Mary's Peak, and plans exist for an extensive trail system throughout the watershed. Some recreational uses may result in conflicts with other resources, between different types of recreation users, and between recreationists and local land owners.

Key Questions

* What are the existing recreational resources? What are the existing recreational use levels and opportunities?

    * What trends in recreational demand affect recreational planning?

* How can we enhance recreational opportunities?

* What problems are we facing with regard to current use levels and opportunities? What problems do we anticipate from increases in use level(s) or providing new opportunities?

* What should be done to enlarge and enhance the public's awareness and knowledge of the value of recreational resources within the North Fork Alsea River Watershed?

Aquatic Domain

Fish Presence & Stocks At Risk

Issues

Numerous native anadromous salmon and trout stocks inhabit the N. F. Alsea Watershed. Some are considered to be threatened and declining, and may be at risk of extinction. Coastal coho salmon and coastal steelhead, including those found in the Alsea River drainage, have been petitioned for federal listing under the Endangered Species Act (see Appendix 2, Map 1).

Key Questions

* What are the natural and human processes affecting wild fish populations?

* What is the current trend, distribution, and population condition of fish species at-risk?

* Where are the barriers to fish dispersal and are there opportunities to bypass these?

* Are there opportunities (short- and/or long term) to enhance positive or mitigate negative trends, or protect at-risk fish stocks?

Riparian Reserves

Issues

Riparian area modifications such as road construction, physical alteration of the channels, and removal of riparian vegetation, large woody debris and complex structure have adversely impacted fisheries habitat and water quality. Flood plains have been restricted and riparian area microclimates have been altered. Many riparian areas are deficient in the large conifers which are future sources of large woody debris.

Key Question

* Given the guidance in the Northwest Forest Plan, what management opportunities and activities exist within the Riparian Reserves?

Water Quality

Issues

Quality of water refers to inherent characteristics of the water body in question and the uses and users of the water. There is a need to identify the beneficial uses of N. F. Alsea waters, the historic and current conditions of these waters with regard to the applicable standards, and any trends which may be influenced by BLM land management decisions.

Key Questions

* What are the natural and human processes affecting water quality?

* What opportunities exist to manage streamside vegetation to improve stream temperatures?

* What should be done to modify road, trail and hill slopes to reduce sediment delivery to streams?

* What are the desired water quality standards (pH, DO) attainable, and what management practices should be instituted to achieve them?

* What should be done to manage watershed vegetation to augment or reduce flow regimes to more desirable levels?

* How does the N. F. Alsea River contribute to and/or affect the Alsea River basin?

Aquatic Habitat

Issues

Habitat for anadromous and resident fish species, and other aquatic species has been degraded and/or declining. Habitat problems include stream sedimentation, lack of large woody debris, lack of quality pools and spawning gravels, reduced stream flows, elevated water temperatures and low dissolved oxygen (DO) levels.

Key Question

* What are the opportunities to manage riparian vegetation and structure in the stream channel to enhance instream habitat and/or stream conditions?

Terrestrial Domain

Vegetation

Issues

Ecological succession coupled with human-caused and natural disturbances has created a mosaic of vegetation types which are quite different from vegetation patterns of the past. Although vegetation patterns are never static, the rate and intensity with which these patterns change can be greatly affected by management activities. Several non-native plant species have been introduced to this ecosystem, and some native plant communities are now declining.

Key Questions

* How have past management activities (e. g., logging) and natural processes (e. g., fire) influenced vegetation patterns?

* What activities and processes (e. g., recreation, noxious weeds, logging) threaten the biological integrity of sensitive botanical areas (RNAs, ACECs)?

* What role does this watershed play in the viability of special plants: federally listed, federal candidates, BLM special status species and ROD species?

* Should prescribed fire be used in the watershed? If so, where and how?

* Given the direction of the Northwest Forest Plan, what management practices could maintain or enhance desired future conditions?

Soils

Issues

Road construction and past timber harvest activities have increased landslide and general sedimentation rates beyond natural levels, and have adversely impacted water quality, aquatic species habitat, and soil productivity.

Key Questions

* How have past management activities and natural processes influenced soil productivity and stability, hill slope erosion and sediment delivery?

* What are the major processes affecting sediment delivery and how do they impact future production?

* What management practices should be used to maintain soil productivity and soil stability?

Wildlife Species and Habitat

Issues

Within the N. F. Alsea watershed, the current habitat condition, distribution, and particularly, the lack of late seral stage habitats are the major contributing factors leading to reduced population viability of some native wildlife species.

Key Questions

* What are the natural and human processes affecting wildlife diversity in this watershed?

* What components of habitat (e. g. LS/OG, DWM, snags, sub-canopy layers, special habitats) are most important to wildlife?

* What role does this watershed play in the viability of special species (e. g., northern spotted owl, marbled murrelet, bald eagle, candidates), and how should it be managed to protect and enhance these species?

* How should the processes and practices which affect the abundance of other priority species (e.g., elk, deer) and their habitats be managed or mimicked?

Chapter III - Reference Conditions

Introduction

Throughout the Holocene Epoch, the time period in which we are now living and during which the climate in the Pacific Northwest has been essentially the same as it is today, a variety of processes -- fire, flood, wind, landslides, disease, and logging and other human-caused disturbances -- have acted to shape the character of the North Fork Alsea River Watershed. Sometimes these processes have acted alone and sometimes in tandem to create a range of effects and patterns on the landscape. This chapter takes a look back in time to describe those processes which are known to have shaped the present landscape or which can reasonably be inferred as having had significant impacts on it. This range of past natural conditions then is the spectrum from which BLM's management goals can be chosen. In other words, somewhere within this spectrum can be found a condition towards which a given block of land or stretch of stream can be managed.

Human Domain

Native Americans

Since 1976, archaeological and historic site field surveys (cultural resource inventories) have been conducted over approximately 20% of the federally managed land (including BLM and USFS) within the N. F. Alsea watershed. As a result of nearly 20 years of such inventory, archaeologists consider the uplands of the Oregon Coast Range to have very low potential for prehistoric site occurrence. Historic sites have not been found to be dense in occurrence in these uplands, either.

The ecosystem of the North Fork of the Alsea has perhaps been influenced by humans for more than 8000 years. However, nothing is specifically known about American Indian use of the watershed. On the edge of the watershed to the west, two prehistoric villages/camps have been recorded in the Alsea Valley. One such site appears to have been a village with evidence of pit structures, as well as tools for hunting, cutting and grinding. Tools found on another site, which covers over nine acres, give evidence of hunting, root gathering and food processing activities.

Prior to the settlement of the Alsea Valley in the mid-Nineteenth Century, the North Fork Alsea River Valley was apparently utilized by the Alsea and Kalapuya Indians seasonally and/or sporadically to harvest resources such as camas and anadromous fish. The construction style of the majority of the artifacts (mostly projectile points) found in and around the Alsea Valley indicates that the Kalapuya people were the main utilizers of the area, although artifacts from coastal groups have also been found. The Kalapuya had a name for Mary's Peak -- "Tcha Teemanwi" -- and may have considered it a vision quest site (Zettler, pers. comm.).

The Kalapuya lived mostly east of the Alsea River basin in the Willamette River Valley, but they apparently traveled west seasonally during runs of anadromous fish to supply protein for their needs.

In contrast, the Alsea Indians lived primarily along the coastal estuaries, but they may have used the Alsea Valley for winter camps to avoid the harsh weather on the coast. Alsea people told of coming up into the Alsea Valley to dig camas in the summer, and said it was a favorite elk hunting area. The valley undoubtedly served at times as a central meeting area for trading goods between tribes, and as a travel corridor between inland and coastal people. At least one historian believes that the Alsea Indians probably ventured into the valley less often than previously thought: "More current information suggests that the Alsea may not have used the Alsea Valley to the extent previously believed. Everything the Alsea could find in the Alsea Valley could be found closer to their coastal homes. An 1856 General Land Office Map does show an 'Indian Trail' going through the Alsea Valley." (Juntunen, in Reynolds 1993, p. 3.)

It is very probable that American Indians used the watershed prior to the arrival of Euro-American settlers. However, extensive alteration of the ecosystem as a result of human presence (the introduction of exotic species, favoring of certain species, elimination of unfavored species) and human use (grazing, logging, burning and fire prevention) did not occur until Euro-American settlement of the area after 1850.

By 1850, both groups had been severely decimated, like most Northwest Native Americans, by diseases introduced earlier by Euro-American explorers, trappers, etc. Given their much reduced numbers and their general physical debilitation, it is unlikely that they would have needed or wanted to have made the arduous effort required to get to the valley. Also, no records available from this time refer to Native American villages.

Indian influences in the ecosystem could have included impacts to animal populations from hunting and fishing activities and impacts to plant populations from gathering. Indian dogs may also have had an impact on game animals. Burning from fires deliberately set to drive game, clear brush, enhance habitat for preferred plant species or from escaped campfires could also have played a role in creating and maintaining the ecosystem. The Kalapuya are known to have systematically burned in the Willamette Valley and adjacent foothills to create and enhance plant and animal habitat for species central to their subsistence (tarweed, camas, and grassland for deer). The Alsea are not known to have purposefully burned.

Euro-American Settlement

In 1812, Congress created the General Land Office[2] (GLO) to sell public lands to encourage settlers to move west ("west" then meant west of the Appalachian Mountains; the Pacific Northwest was not yet part of the U. S.) and bring new lands into production. Jedediah Smith likely crossed the Alsea River in 1827, and Hudson Bay Company and American fur traders and trappers may have ascended the valley in their search for fur-bearers, but such visits are not recorded. Trapping of fur-bearing animals in the Alsea watershed probably occurred either by Indians who then traded pelts to the fur company representatives or by company-hired trappers.

In 1849, Lieutenant Theodore Talbot led an expedition into the Coast Range and down the coast to the Alsea River. Talbot journeyed a short distance up the Alsea River from Alsea Bay, finding heavy stands of timber along the river shores. The Indians at Alsea told him there were no trails up the Alsea River because the forest was impenetrable; they considered the country along the Alsea River and across the Coast Range to the Willamette Valley very rough. In his report, sent to the Secretary of War in 1850, Talbot reported that the main part of the Coast Range was not, at that time, inhabited by either whites or Indians.

[2] The GLO was merged with the Grazing Service in 1946 to create the BLM.

Several years passed before true settlers reached the Alsea Valley. The Oregon Territory (what is now Oregon, Idaho, Washington and western Montana) was established in 1846 as public land to stimulate settlement of the Pacific Northwest, but no settlers came to the Alsea Valley until after most of the Willamette Valley's best and most accessible lands had already been claimed (Reynolds 1993).

The first settlers appear to have moved into the Alsea Valley in 1852, although it "was undoubtedly probed by curious inhabitants of the Corvallis area for several years prior to its actual settlement." "Most of the prime farmland (I. e., the flat lowlands flanking the rivers) in the upper Alsea Valley was claimed by 1855, the deadline for filing claims under the Donation Land Act." (Reynolds 1993). The Donation Land Act of 1850 had applied to the "Oregon Country," and allowed settlers to claim 320 acres if single, 640 if married. Following the great influx of settlers into the Willamette Valley via the Oregon Trail in the 1840s and 50s and the expiration of the Donation Land Act in 1855, Congress passed the Homestead Act in 1862 to continue to promote settlement of public lands in the West.

Over time, land in the North Fork Alsea River Watershed was claimed as far upriver as the confluence of the North Fork and Crooked Creek. Some land, such as that around the confluence of the North and South Forks, was unclaimed because of its propensity to flood, and uplands were of little interest except as sources of timber and places to graze livestock. (Reynolds 1993) Many of these uplands remained public lands eventually to be managed by the BLM.

Lasting impacts to the watershed may have included introduction of exotic plant and animal species, elimination of undesirable native species, hunting, land clearing, grazing, and removal of forest products. However, with the possible exception of introduction of non-native species, reduction/elimination of some native species, and fire exclusion efforts, impacts from these homesteading attempts, whether they succeeded or failed, are probably localized in extent.

Life in the Valley

The narrow confines of the valleys of both the North and South Forks of the Alsea River naturally limited the degree of development of which the area was capable. Although the Surveyor General's map of 1855 shows "Alseya Settlement" at the confluence of the two forks, there was no true town there, but rather a small number of farm homes in relatively close proximity. (Reynolds 1993) Being isolated from any substantial markets, the pioneer farmers lived a subsistence existence. Each probably had a small number of livestock, a personal vegetable garden, and fields of wheat, perhaps barley and/or oats, and hay. Until 1873, when a flour mill was built at the upper end of the valley, grain had to be hauled over the mountains to a mill in Corvallis. Surplus grain or flour was probably sold there; flour for home use was hauled back over the pass. Livestock were probably driven to market "on the hoof" because of the poor roads. (Reynolds 1993) In the summer, settlers drove their livestock up to the grassy balds in the Coast Range, including Mary's Peak and Grass Mountain to graze. Summer grazing on the grassy balds continued into the 1940s. Farmers and ranchers burned areas of forest land to provide grazing and minimize timber growth on pasture land near their homes. (See below for a brief discussion of early logging in the watershed.)

Over time, of course, trails developed, and if sufficiently used, were widened into dirt wagon roads eventually to be improved further with gravel or asphalt. Travel towards the coast, however, depended upon the river. Farmers built scows, filled them with goods and floated them down river to Waldport. There, they sold the goods, broke up the scows in order to sell the wood, and walked home. The main travel route to the Alsea Valley went up the South Fork of the Mary's River and down the North Fork of the Alsea. In the late 1870s to early 1880s, the Alsea-Corvallis and the Alsea-Lobster Valley roads were built. These roads were difficult to travel, but did open up the area to greater commerce. Eventually, these roads evolved into current Highway 34, giving Alsea and the valleys around it links in two directions to the rest of the state. (Reynolds 1993)

Life probably fell into a comfortable routine well into the Twentieth Century as "The population apparently continued to grow slowly until the 1930s when the Great Depression forced some farmers off their land. The depression was especially hard on the owners of upland farms, which were situated on soils poorly suited to agriculture in the first place." (Reynolds 1993) A number of families moved out of the area, several small schools closed and the abandoned farms reverted to forest. This scenario was apparently much more prevalent in the South Fork drainage than in the North Fork. In 1935, the Alsea Fish Hatchery, specializing in steelhead, was opened in the south-central portion of the N. F. Alsea watershed. Paved roads and electrification finally ended the extreme isolation of the watershed, but even today, it is little more developed than it was one hundred years ago.

Early Sawmills

It can be presumed that timber from the very earliest harvest operations was processed on the nearby homesteads in the process of clearing land and building structures. Then, according to Reynolds (1993), an early settler, Squire Rycraft, built the Alsea Valley's first sawmill in the "upper South Fork" in 1853. (There are no records of sawmills or commercial logging in the N. F. Alsea watershed prior to the turn of the century.) The sawmill probably cut and milled logs for local use and not for export. Transportation at the time was sufficiently adequate to permit this mill to provide lumber for a barn Rycraft helped build in the Willamette Valley, eight miles to the east. (Reynolds 1993; Rycraft sold this mill in 1860, and Reynolds does not trace its fate thereafter.)

Reynolds quotes an 1885 Benton County history stating that two sawmills were in operation in 1885, both probably in the South Fork drainage. The Inmon mill had opened in 1868, was "located on the upper South Fork approximately 12 miles west of Monroe," and employed 22 men. (Reynolds 1993, p. 8) In 1884, David Ruble built a "new sawmill 'in the forks formed by the Alsea River and Rock Creek.'" (In 1873, Ruble built a grist mill in the same vicinity, I. e., west of the watershed analysis area.) At the very least, it appears that timber harvested in the watershed could have been transported to the Inmon sawmill located a few miles to the south of the watershed boundary, or to the Ruble mill.

Early Logging

The earliest logging in the Pacific Northwest was done with jack screws and horses, oxen and mules. The first logging operations in the N. F. Alsea watershed probably occurred along what is now the Alsea Highway (34) and the nearby flat alluvial flood plains of the Alsea River, clearing the way for farming and ranching.

For larger operators, these methods soon became outmoded. William Kyle, a sawmill owner along the southern Oregon coast, had this to say in a letter written in the 1890s: "This idea of hauling logs with bull teams is outdated, and is too costly, the proper way is with a logging engine [steam donkey] and wire rope, when the machine don't work it don't cost anything to keep it and you don't have to feed it when it is not earning anything." (Farnell 1979)

Steam donkeys soon became the preferred method of logging. These machines (self-propelled steam engines that pulled themselves along the ground) would usually be set up in a canyon or stream bottom, large cables would be strung up the hill, and the logs yarded down the slopes. Dragging the logs displaced large areas of soil and vegetation, and with the first fall rains, rivers and streams would become muddied with the sediment from this disturbance.

From first-hand observations and conversations with long-time watershed residents, it is clear that railroad logging was employed throughout the Honey Grove, Seely and Lower Crooked Creek sub-basins which form the southeast corner of the watershed (Early Logging Zone). When this practice was used, a steam donkey often would have gone ahead of the railroad construction operation to cold deck the logs. They were later loaded and hauled out on the railroads.

Records of the O & C Administration, and its successor, the BLM, show that the U. S. government was selling timber in the North Fork Alsea watershed starting in 1929. [Timber sales (called "timber patents") then continued essentially up to the present.] In 1937, Congress passed the Oregon & California Revested Lands Sustained Yield Management Act. This legislation mandated the Department of the Interior to harvest and sell timber on O & C land on the basis of "sustained-yield" (the first such sustained yield law in the U. S.), and to return a portion of the revenues to the western Oregon counties from which the timber was harvested. This added thousands of acres to the timber lands which could potentially be harvested in the N. F. Alsea watershed.

[Note: In 1866, Congress had granted a potential of 3.7 million acres of land to the Oregon & California Railroad[3] (O & C) as a subsidy for building a line south to California from Portland. Because the railroad did not comply properly with the terms of the grant, Congress (in 1916-19) took back (revested) the 2.8 million acres of the grant lands which had not already been sold by the railroad. These acres thus again became public lands to be administered by the GLO, and later, the BLM. In the N. F. Alsea watershed, 17,828 acres, or 89%, of BLM land is "O & C" land; the remainder (2,253 acres; 11%) is "public domain" land which was either never privately owned or which for some reason reverted back to federal ownership.]

Through the 1930s to the early 1950s, logging by running steam donkeys up canyon bottoms, raising a wood spar, and logging downhill was the norm on private lands. Toward the end of this time period, crawler tractors became a common sight on logging operations. Evidence of early tractor operations can still be seen in some areas of the N. F. Alsea watershed. Tractors operated on the hill slopes and on the stream banks, transporting logs to cold decks next to railroad lines or near the limited roads that had been constructed.

Fire Lookouts: 1930s to mid-1950s

Three fire lookouts were built in or overlooked portions of the N. F. Alsea watershed. The first Mary's Peak Lookout was built in 1935, replaced in 1959, and again in 1963. Grass Mountain's first lookout was built in 1935, and replaced in 1951. A lookout was also constructed on Alsea Summit, and used from 1939 to 1950.

Forest Roads

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3 [2]By 1898, the O & C had been absorbed by the Southern Pacific Railroad.

Downhill logging using steam donkeys or crawler tractors usually limited harvest to about 800 feet upslope from the location of the donkey or cold deck. By the 1950s, uphill logging had been initiated due to the dwindling supply of accessible timber near the stream bottoms and the growing demand for lumber. While it took a decade or more to make this transition, forest roads eventually were constructed which wound along side slopes up to ridge tops.

Initially, roads were constructed using side-cast construction techniques which involved: 1) removing vegetation and stumps; 2) scattering them down-slope; 3) excavating into the slope; and 4) placing the excavated material down-slope to produce a flat road template. In many cases, the road fills would cover much of the vegetation, stumps and logs left from clearing operations. Where roads crossed streams, sound logs were placed over the stream and filled over with excavated material while log stringer bridges were constructed across major streams. Roads were generally 14 feet wide, out-sloped, surfaced with native rock material encountered in nearby excavations, and usually followed the contour of the ground. Legacies of early road construction still exist throughout the watershed. Over time, the decay of buried out-slope logs, stumps and vegetation, and poorly designed road locations have resulted in increased stream sedimentation as well as slope failures.

Reciprocal Rights-of-Way

As the patterns of land ownership became increasingly complex and intermingled, methods of permitting adjacent landowners to gain access to their property had to be reached. The most common instrument through which these agreements were (and are) reached is the "reciprocal right-of-way." With respect to BLM lands, a reciprocal right-of-way is an exchange of grants between the United States and a Permittee (adjacent landowner, usually) which provides for each party using the other's roads or constructing roads over the other's lands. According to the RMP, "This plan will not repeal valid existing rights on public lands. Valid existing rights are those rights or claims to rights that take precedence over the actions contained in this plan. Valid existing rights may be held by other federal , state, or local government agencies or by private individuals or companies. Valid existing rights may pertain to mining claims, mineral or energy leases, rights-of-way, reciprocal rights-of-way, leases, permits, and water rights." Nothing in this watershed analysis document is to be construed as altering in any manner or form the valid existing rights referred to in the paragraph quoted above.

Modern Logging Methods

As with other industries, loggers were always developing new and more efficient ways to do business. By the 1960s the use of steel spars was becoming commonplace throughout the Coastal Province. This was the time of the beginning of the patch-cut land pattern we see today, as well as a time when timber harvest and road construction increased on federal lands.

In 1960, for example, for the first time on O & C land, the annual cut was over one billion bf. (Muhn and Stuart 1988).

With the 1970s came a more focused emphasis on multiple-use management of the federal forest resources as a commodity for the public. In 1973, the Endangered Species Act (ESA) was passed providing protection for plants and animals facing extinction and for their habitats. Three years later, the Federal Land Policy and Management Act (FLPMA) was passed. By passing this legislation, the "organic" act under which the BLM operates, Congress established policy to retain the public lands and to provide for the multiple-use and sustained-yield management of public lands and resources through land use planning. Around this same time, commodity resources on federal lands were gaining rapidly in value, and many independent loggers moved from logging on private land to federal lands. Clear-cut sales, salvage sales, and cedar sales were in demand throughout the watershed. This period also saw increases in ridge-top road systems, large clear-cuts, hot prescribed fires and aggressive reforestation programs.

The early ‘70s were also a time of increased awareness of landslides which typically originated from two sources: 1) steep slopes and headwall areas over-loaded with side-cast from past road construction material, and 2) clear-cut units. When these slides occurred, they generated large quantities of soil, gravel, logs and logging slash which jammed up in various locations. Recognized as substantial barriers for hydrologic processes, and at times for spawning salmon, a program was initiated to pull these jams apart.

The mid- to late 1970s brought dramatic changes and skyrocketing prices for the timber being offered on Federal lands. Spurred by concern for degraded fish habitat, the BLM began requiring end-hauling of excess material on critical slopes, compacting fills, appropriate sizing of drainage culverts, skyline logging systems, and retention of streamside buffers and headwall leave areas. Road construction methods which had included crawler tractors pushing soil and rock, dynamite charges large enough to blow the material down the slope and out of the way, and modified side-cast road construction gave way to careful excavation with tractors, excavators, and scrapers. These machines would clear brush, excavate stumps and soil, and haul the material to designated waste areas where it was consolidated and seeded with grass. Large mechanical rollers used to compact road fills, subgrades, and rocked surfaces helped to reduce the potential for slides and erosion from road construction.

While uphill highlead systems were still permitted on non-critical slopes, new skyline yarder systems partially or fully suspended logs over sensitive areas and streams. Previous equipment changes in the logging industry had been comparatively inexpensive modifications of equipment already on hand, but these new yarders were big, heavy, high tech, and very expensive -- $1,000,000 or more. This was also a period when concerns about the lack of dissolved oxygen in streams and the number of debris torrents within harvest units lead to systematic removal of all woody debris from stream channels within harvest units, a practice which continued for a number of years.

Lumber prices dropped in the early 1980s, and the high prices they had bid in the late 1970s were nearly catastrophic for most companies buying federal timber. When companies could not afford to harvest the sales by the contract expiration dates, the government provided five-year contract extensions, and then later bought many of the contracts back in exchange for designated penalties. During this same time, two environmental concerns -- preserving the last remaining old-growth forests in the Pacific Northwest and giving added consideration to the Northwest ecosystem as a whole -- resulted in a series of legislative appeals which lead to industry and environmental gridlock.

Concerns about soil compaction, the depletion of soil nutrients through hot prescribed burns, and wildlife and fish habitats and needs on federal forest lands surfaced during the 1980s and have continued to the present. Highlead and tractor logging were nearly eliminated on federal lands as were hot burns. Operators used almost exclusively large slackline yarding systems (occasionally spanning distances exceeding one mile to obtain adequate log suspension) and motorized carriages to protect stream buffers and adjacent managed stands better. When building roads, the big crawler tractors and scrapers of earlier days were scrapped in favor of large hydraulic excavators and dump trucks for greater excavation control.

Timber sales during the end of the 1980s included fewer large old-growth trees. As the big, slower yarders wore out, they were (and are) being replaced with faster, slightly smaller ones with a focus on logging second-growth timber. As wildlife needs were recognized, clear-cuts were reduced to less than 40 acres. Woody debris and standing snags and trees were retained, and habitat reserves were created for various species, especially the northern spotted owl and marbled murrelet. Existing logs and limited logging slash were left in streams to create and maintain fish spawning and rearing habitat.

Today, with stumpage prices once again increasing, logging with helicopters has been increasing in use, especially on private lands. Because of the reduced road system and precise harvest prescriptions attached to harvest units, an increase in helicopter logging can also be expected on Federal lands. The reduced emphasis of harvest on Federal lands and the increasing value of stumpage prices can be expected to increase harvest on private lands within the watershed. Most of this logging will occur in areas that were logged earlier in this century.

Recreation

Extensive data are not available about the use of the North Fork Alsea River Watershed by Native Americans in general, so it is speculative to suggest whether they used this area for "recreation." Their subsistence lifestyle probably left little time or energy for recreation in the modern sense. However, a few of the activities in which they engaged, e. g., hunting and fishing, must have provided some of the participants with satisfaction similar to that enjoyed by modern practitioners of these pastimes. Much the same can be said of the early settlers: many of them must have participated in hiking, horseback riding, hunting and fishing and similar activities for the sheer enjoyment of them.

The watershed has long been popular for the following recreational activities: driving along Mary's Peak Access Road with its panoramic vistas; motorcycle riding on BLM's Greasy Creek/Gleason OHV trails (motorcyclists cross over the southeast ridge of the watershed on a set of old railroad rights-of-way known as "the Grade"); winter (snow) sports; dispersed camping; mountain biking; photography; birding; target shooting; photography; public education; stargazing and wildflower identification. "Consumptive" recreational activities have included berry picking and non-commercial collection of trees, mushrooms, moss, bear grass, rhododendrons and other plants. Hunters harvest both big and small game in the watershed while privately-owned Klickitat Lake and the North Fork Alsea River provide fishing for trout, steelhead and salmon.

Mary's Peak, Recreation and the U. S. Forest Service

Construction of the Mary's Peak Access Road began in 1938, and in the 1940s, the Forest Service acquired the immediate top of Mary's Peak and built a picnic ground there. With its ready public access, picnic ground, and lookout, Mary's Peak became a focal point for recreation activities from nearby Corvallis and Philomath. Both summer and winter activities occurred, with portable ski tows operating between 1942 and 1952. In 1958, the Air Force extended the Mary's Peak Access Road to the top of the peak and it was subsequently transferred to the Forest Service. Since 1989, the road and parking areas have been included in the Oregon SnoPark Program.

Most recreational attractions/activities in the North Fork Alsea River Watershed have been focused on the USFS lands and facilities around Mary's Peak. Such activities have included both individual and organized recreation; hiking, picnicking, and snow play have been particularly popular activities. In the 1970s, the Corvallis Trails Council built the North Ridge Trail on USFS lands; their vision was to build a trail eventually from "Corvallis-to-the-Sea." Other trails were built on the Peak to concentrate visitor use in order to minimize impacts on fragile plant communities. In 1985, a new Forest Service campground and picnic area were constructed on the northern border of the watershed**.** Repairs to Forest Service recreational facilities have often been necessary due to vandalism.

Aquatic Domain

Water Quality, Stream Channels and Riparian Reference Conditions

Assumptions

Pre-settlement reference conditions are provided for the current major climatic period (Holocene Epoch: approximately the last 7,000 years). Native American occupation of the Coast and use of the N. F. Alsea watershed is assumed to have occurred throughout this period. The Native American influence is considered a natural disturbance factor and process within the N. F. Alsea watershed.

Analysis of conditions during this time is largely based on process inference, logic and professional judgement, and is a hydrologic interpretation.

The extent of the channel network existing in the Holocene is assumed to be similar to that expressed today under the same climatic regime. It is also assumed that changes in climate experienced during the Holocene (in the western half of the continent) included the Coast Range and the North Fork Alsea River.

Fundamental changes in water quality, quantity and riparian conditions over the Holocene time- scale are directly related to catastrophic events, and provide the necessary context for watershed analysis and directing management actions throughout the watershed.

Pre-settlement

Within the last 7,000 years, water quality, water quantity and general riparian conditions within the N. F. Alsea watershed (and the Coast Range) have been affected by catastrophic disturbance events. These "natural" events shaped the landscape and provided the mechanisms for watershed-wide changes to the stream and riparian system. These changes varied over time in the frequency of the event, and varied in their distribution and occurrence within the watershed. Wind storms, flood events and stand replacement fires have all contributed to "natural variability of condition" throughout the period. The following discussion focuses on the range, frequency and distribution of these particular events and their potential impacts, resiliency to change and the resulting condition.

Wind

In all likelihood, windstorms occurred during this period due to the same climatic patterns as are present today. During periods of mature forest conditions with fully developed canopies, windthrow in riparian zones and wetlands would have resulted in a minor but steady introduction of new wood into the aquatic system. Catastrophic windthrow events which would have accounted for major changes in stream temperature, sedimentation, and riparian degradation were most likely associated with stand replacement fires and assumed to have approximately the same return period (see fire section). During periods of "edge" exposure, such as after a wildfire or landslide, riparian areas and wetlands with trees still standing would have experienced higher levels of windthrow. (Damaging winds are intensified when a wide expanse of open area is windward of the remaining forested strip.) Old-growth Douglas-fir is particularly susceptible to windthrow due to its form and height (Stienblums 1977). The confined riparian reaches of the N. F. Alsea watershed were predominately Douglas-fir mixed with western red cedar and hemlock (see vegetation section).

By using the Yaquina Fire of 1850 as a benchmark indicator of wildfire influence on riparian zones, it appears that most riparian vegetation in the higher elevations would have been consumed by wildfire. Remaining snags would have become stream material within the 15 to 100 years following the fire as their roots rotted and wind and/or gravity delivered them into the streams. Mid-elevation (1,000 ft to 1,800 ft) riparian zones may have remained somewhat intact as the fire effects fingered through this zone. The remaining riparian trees would have been susceptible to windthrow, with steady recruitment into the streams until a catastrophic wind event (similar to the Columbus Day storm of 1962) occurred. At that point, most standing old-growth riparian trees might have been wind-thrown due to the exposure of their massive boles and canopies. Pockets of trees would have remained in reaches that were protected by valley confinement. Western red cedar may have remained standing in much of this zone due to its natural stability (fluted bole at base).

Loading of the channel with windthrown trees after wildfire would have functioned in the retention and release of sediment "pulses" moving through the system after exposure of soil. Old-growth windthrow has a high probability of breaking up, but the root wad section usually stays in the location in which it falls. These pieces would have persisted in place despite flooding; large pieces would have remained in place in the smaller tributaries. The large wood within the channel would persist over time due to the cool, moist conditions and low rates of decay. Almost all old debris in channels associated with Coast Range wildfire sites consisted of conifer and most was from the size class associated with the burn. (Heimann 1988)

Riparian vegetation in the lower elevations, which may have occurred along openings created by Native American burning, would also have been subjected to blowdown on a continuing basis. If the Native American burning resulted in a large opening adjacent to the riparian zone, windthrow potential would be high. Deeper soils, higher productivity and available moisture would have allowed conifers to reach mature size before windthrow occurred. These lower elevation stands were probably more diverse in age class and species, due largely to the dynamic nature of the floodplain. As single trees became larger, potential for windthrow became higher, and as the channel shifted, it undercut roots and recruited material. It can be inferred that introduction of wood to the system was steady over time and less windstorm related.

Floods

Throughout the Holocene Epoch, including the present time, the central Oregon Coast Range has experienced severe storms which included intense rainfall and flooding. These floods are a dominant force in channel and riparian change, and a key routing mechanism for sediment and large wood. Such flooding resulted in dynamic changes to the channel and riparian zone in the N. F. Alsea watershed, particularly in the lower gradient reaches with floodplains. Channel form and roughness, including large wood and riparian vegetation, dissipated flood energy and contributed to the resiliency of the system.

Large wood has played an important role in the N. F. Alsea watershed as a channel roughness factor. In the higher gradient streams such as Peak Creek, Yew Creek, and Easter Creek, large wood provided much of these channels' ability to absorb stream energy and to capture sediment. Downstream, in the lower gradient reaches (<3%), log jams created pools and provided channel connections with the flood plains and riparian zones. This wood and the benefits it provides persisted over long periods (350+ years, depending on the decay rate). Much of this wood was retained in place as many individual pieces were too large for the smaller tributaries to move even during flood flows.

The routing of flood waters and sediment throughout the lower watershed was largely controlled by a properly functioning riparian system consisting of a forested flood plain which slowed flows, protected stream banks and retained sediment. In the lower reaches, flood plains would have remained saturated throughout most of the year and would have supported a rich, jungle-like growth of riparian species (e. g., big leaf maple, western red cedar, scattered red alder and willow with a dense shrub understory). Field and aerial photo reviews indicate that the lower reaches of N. F. Alsea (between river mile 49 and 51) historically had access to a wider flood plain than does the present incised channel. Old meander scars and tributary channels are visible on aerial photos indicating a channel system which spread water and allowed more interaction with the flood plain than what occurs presently. Historically, this channel dissipated the energy of high flows by flooding the surfaces of what are now well drained fields. This process minimized channel and bank scour while capturing sediment on the flood plain. Many of the low gradient reaches in the Alsea River probably functioned in this manner.

Following catastrophic introductions of sediment and organic materials to the system, such as after wildfire and landsliding, flood events would act to distribute the material throughout the channel network. Washload fines would result in visible turbidity during peak flow events as sediment was routed through the watershed. Landsliding is likely to occur during flood events due to saturated soil conditions and presents the most probable chronic source of sediment to the natural system. The most likely source areas would have been sites with high landslide potential whose vegetation had undergone loss of root strength following wildfire. These areas include Peak, Yew, Alder and Easter Creeks.

Fire

Throughout the Holocene Epoch, including the present time, large scale, severe fire has been a normal occurrence in the central Oregon Coast Range. Fires occurred at infrequent intervals when fuel and weather conditions coincided with an ignition source. The size of high intensity events (referred to as "stand replacement fires") has generally been on the order of 10,000 to 500,000 acres or more. The return interval for such events is believed to range from 100 to 350 or more years.

There is evidence to suggest that during periods of dry, warm conditions, wildfire was much more frequent. If this is correct, it would be expected that there was a downward trend in the water quality (sedimentation and temperature) during the periods of higher fire frequency. This in turn could have impacted aquatic population trends. Following wildfire, changes in water yield and summer flows would have been positive, providing an increase in flow for the aquatic community. This may have been offset by significant sedimentation (turbidity) of pools and channels along with increases in temperature following removal of the riparian canopy. Recovery rates may have been slow enough to affect several generations of returning anadromous fish. Both of these water quality conditions would have been stressful to salmonid populations as a whole since they would have impacted spawning, rearing and resident holding reaches.

During a stand replacement fire, typically 80% or more of the vegetation is destroyed or at least killed. If severe storm (rain or rain-on-snow) events occur in the decades following a severe fire, significant increases in surface erosion and in the number and extent of shallow landslides would occur. Severe fires will usually destroy all the vegetation in headwall areas due to the compounding effects of topography and radiant heating. These headwall areas could be expected to fail and advance upslope significantly for several decades following a fire. This would occur as root strength from the mature vegetation is lost through decay and as dry raveling delivers new material to load the headwall again. In very large events, re-establishment of timber may be delayed for periods up to fifty years or more due to loss of nearby seed sources. This could result in prolonged periods of high erosion and slope failure.

Much of the coarse sediment and large wood delivered to a stream system would occur during this time (up to a century or more) following a severe fire. During the intervening centuries between fires, much of the material delivered during the early years following the fire would be washed, sorted and routed through the system, and eventually leave it. This wood and the benefits it provides would have persisted over intervals longer than the return periods of floods or fire.

A stream system located in a severely burned area would probably pass through a series of stages beginning with high turbidity due to high sediment/debris input. This would have been followed by an extended period of washing, sorting and routing of sediments, and perhaps reach eventually a degraded condition in which upstream sediment sources become depleted and/or less active and the streambed down-cuts and/or reaches bedrock. This cycle could be interrupted or set back as new failures occur upstream, resulting in fresh inputs of sediment and debris. (For additional discussion on the effects of stand replacement fires in the Coast Range, see the Terrestrial section of this chapter).

Fisheries

Little is known about specific habitat conditions and fish populations prior to 1945. This section however, relates events and activities (human and natural) which may have effected the N. F. Alsea watershed and the fisheries in it before that time.

Historically, a variety of natural processes such as fire, floods, landslides and wind storms played a significant part in fish habitat condition and populations. It is also believed that many human activities such as home sites, pastures, splash dams and other early logging methods (i.e. jack screws and horses, oxen and mules, sawmills, steam donkeys, tractors, railroad logging and road building) played a significant part in fish habitat condition and populations. It is presumed that fish populations may have fluctuated due to these events.

On a spatial and temporal scale natural processes i.e. fire, floods, landslides, and wind storms, may have contributed to log jams that prohibited fish migration, sediment inputs that reduced the probability of egg survival, and high streams flows that would prevent spawning from taking place during the spawning season. However, the same natural processes resulted in abundant log jams which provided in-stream cover and dissipated flow. Large woody material probably trapped spawning gravel and created rearing pools, particularly in the lower gradient (< 3% gradient) sections of the N. F. Alsea River watershed. Natural processes are dynamic and spatial, always contributing to a varied landscape.

Pre-settlement and Settlement

Prior to the settlement of the Alsea Valley in the mid-Nineteenth Century, the North Fork Alsea Valley was visited seasonally and/or sporadically by Natives Americans to harvest resident and anadromous fish as a food source as well as for other traditional or ceremonial uses. Fish populations and habitat probably were not significantly influenced by the actions of these indigenous tribes. However, nothing is specifically known about species presence, fish populations or habitat conditions prior to settlement.

The first settlers appeared to have moved into the Alsea Valley in 1850s. The narrow confines of the North Fork Alsea River valley naturally limited the degree of development of which the area was capable.

Additional settlement may have occurred in the Seely, Honeygrove and Crooked Creek subwatersheds. It can be presumed that timber from the very earliest harvest operations was processed on nearby homesteads. Influences on fisheries habitat and populations is unknown; however, one can assume that impacts were minimal due to the widely scattered nature of the homesteads.

By the late 1800s and early 1900s, fish habitat was being altered substantially. Much of the valley bottomland and areas along the lower mainstem and the lower portions of the large tributaries had been cleared for pastures and home sites. These activities substantially reduced the amount of active flood plain and eliminated many of the productive flats, side channels, and seasonal refuge areas within the lower basin of the N. F. Alsea watershed.

Changing the stream channel morphology and removing stream bank vegetation increased channel scour, reduced bank stability, and increased sedimentation in these same areas.

The number of large conifers that have the potential to fall into streams was reduced substantially along most streams adjacent to developed pasture lands.

A number of areas were initially cleared and developed as homesteads in the late 1800s and early 1900s. While concentrated in flat valley bottom areas, these sites were distributed throughout the valley and often extended up into the headwaters and tributary streams. The initial clearing eliminated almost all of the large conifers which had a potential to fall into streams in these areas. Many of the initial homesteads failed and were abandoned, and without management or replanting, most of this abandoned farmland has become thick alder stands or brush patches. The dense alder canopies which now exist delay the establishment or growth of new conifers which might provide future sources of large woody debris for adjacent streams.

Roads and trails were constructed along the N. F. Alsea and throughout the watershed area. In addition to increasing sediment and altering the drainage network, the presence of roads immediately adjacent to stream channels substantially reduced the amount of riparian vegetation and the number of large conifers available to fall into the streams.

Timber Harvest

Early on in the 1900s, private landowners realized the value of the immense stands of trees that occupied their property. At first, the harvest operations were scattered and selective in nature, primarily due to the labor-intensive methods employed at that time and the remoteness of the area. Soon all this would change.

Early logging done with jack screws and horses, oxen and mules may have influenced fish habitat and population. This was the earliest logging method used in the Pacific Northwest. This type of logging operation occurred along what is now highway 34 and the Crooked Creek drainage and may have affected the fishery in Crooked Creek.

Another logging method that may have affected the N. F. Alsea is the steam donkey. Steam donkeys would usually be set up in a canyon or stream bottom. Areas where steam donkeys were used may have lost significant structure in the stream bottoms with a concomitant decrease in the amount of suitable habitat for fish. The engineering system of the steam donkey for harvest operations resulted in significant ground disturbance and may have been responsible for landslides, large amounts of sediment and the removal of instream structure.

Railroad logging was employed throughout the Honey Grove, Seely, and lower Crooked Creek sub-watersheds, (Early Logging Zone). When this practice was used, a steam donkey often would have preceded the railroad construction operation There are no known data on the effects of railroad logging in this zone or other zones of the N.F. Alsea; however, it can be presumed that significant impacts to the fisheries resource did occur.[4]

Lastly, tractor logging and an increase in road building contributed to increased stream sedimentation, slope failures and stream diversions. Tractors operated on hill slopes and/or stream banks transporting logs to cold decks next to railroad lines or roads. Poorly located and/or designed roads failed over time, resulting in increased sedimentation and slope failures. There are no data verifying the impacts these activities had on fisheries resources or populations. It can only be assumed that in specific locations it may have been significant.

Splash Dams

Some time in the 1800s at least one splash dam was operating on the N. F. Alsea River (Moser and Farnell 1981; Sedell and Luchessa 1982). This splash dam was located just below the confluence of Bailey Creek. Splash dams were constructed to transport logs downstream during all flows. It is not known if splash dams were built any where else in the Alsea River Basin. It is also not known how much use this dam received during it operation. It is believed that splash damming in general occurred for a period of approximately 27 years.

Splash dam operations caused extensive channel simplification and degradation of fish habitat through the disruption of riparian vegetation and the removal of gravels and in-stream structure in the N. F. Alsea

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[4] See Chapter 3, “Early Logging,“ for a description of railroad logging techniques.

River watershed. Substantial changes occurred during splash damming activities such as stream widening, stream bank scouring, and the removal of trees, logs and boulders in order to prevent log jams during the drives (Sedell and Luchessa 1982). It is thought that splash dams may have had a greater impact on streams than floods because release of the splash dams were repeated time after time during the year, removing in-stream structure, and keeping the streams somewhat channelized and clear of instream structure.

Fire, Floods, and Windstorms

Catastrophic fire, flood, and windstorms events would have accounted for major changes in stream temperature, sedimentation, riparian degradation, and fish populations. See "Water Quality, Stream Channels and Riparian Reference Conditions" section in this chapter for processes that may have occurred after such an event.

Historical Value, Distribution and Abundance of Fish Within the Watershed

Historically, the Alsea River basin produced large numbers of chinook salmon, coho salmon, and winter steelhead (see Figure 3.1).

The Oregon Department of Fish and Wildlife has been gathering data from commercial net fisheries, angler catch and spawning surveys for many years, in some cases as far back as the 1920s. The following is a synopsis of individual fish species population trends as they relate to the Alsea basin, including the N. F. Alsea.

Commercial net fisheries in the Alsea during the 1920s and 1930s indicate that spring chinook runs were much higher then than they are today. During this time period, the majority of Alsea chinook were caught from May through July, indicating a much higher proportion of spring or summer fish and a lower proportion of fall chinook than occurs today.

Commercial net fishery landing of coho in the Alsea are thought to represent less than half the annual coho return to the Alsea. Annual run size throughout the 1892-1956 time period was usually greater than 20,000 and may have been as high as 100,000 in some years.

Winter steelhead hatchery fish have been stocked in the drainage since at least the 1930s. Prior to 1964, almost all steelhead smolts were directly released from the hatchery. This reportedly produced little straying to adjacent tributaries in the Alsea basin (Wagner 1967).

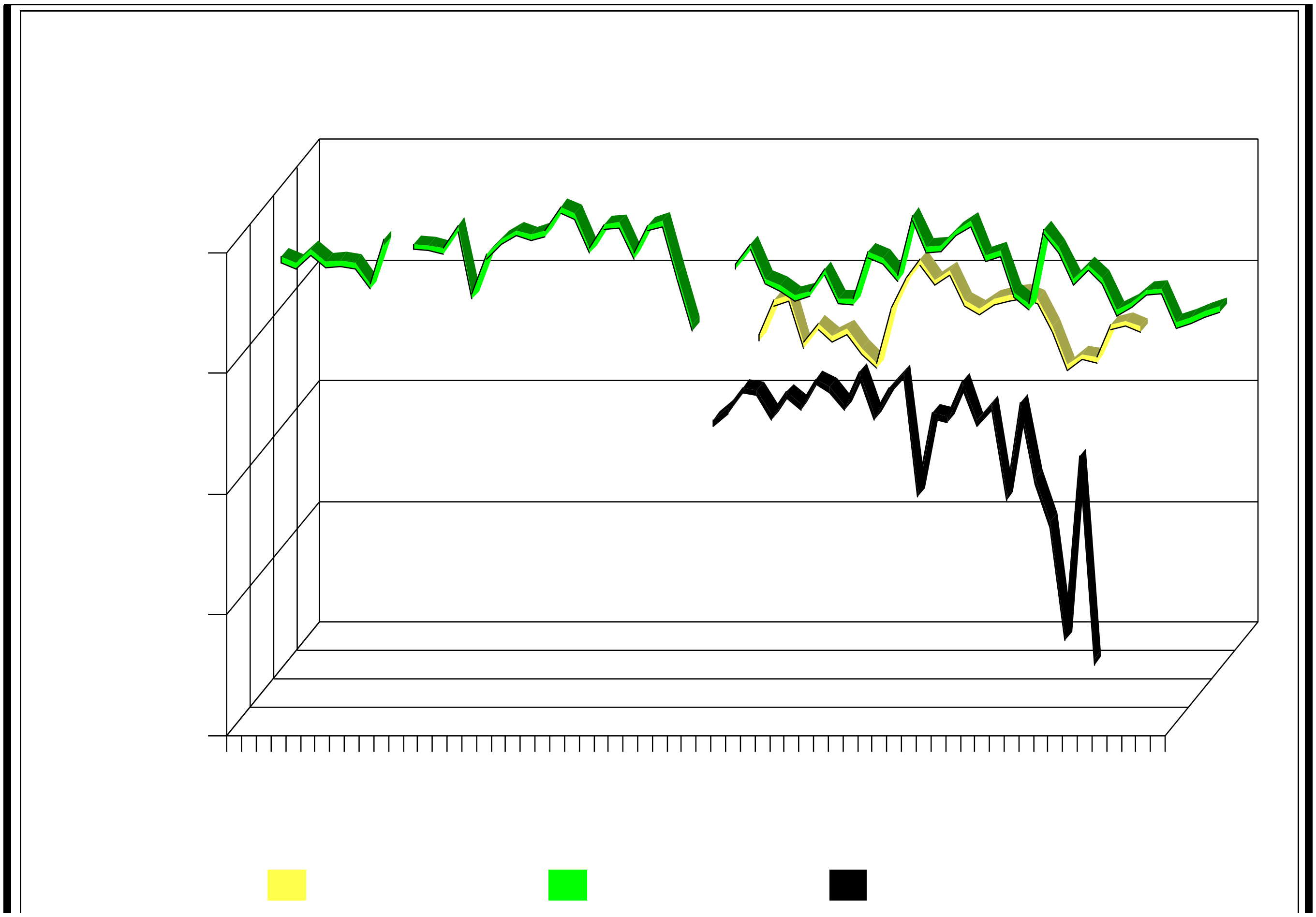
Commercial net fisheries in the Alsea Basin provide some indication of historic run size. The 1923-1940 average catch of 29,200 pounds equates to catch of about 3,200 steelhead (assuming the fish averaged nine pounds). The harvest rate in these early net fisheries is unknown so it is not possible to convert these estimated landings to a total run size estimate with any reliability.

There is no historic value, distribution or abundance information available for lamprey and sea-run cutthroat trout. A common practice is to assume distribution of sea-run cutthroat and lamprey historically in all streams unless passage was blocked.

Salmon and trout have long provided recreational fishing opportunities within the basin, with most activity concentrated in the Alsea Bay and the main stem Alsea River. Wild populations of coho, chinook, chum, steelhead, and cutthroat trout are still present within the basin. In 1935, the N. F. Alsea Fish Hatchery, specializing in steelhead, began operation in the lower N. F. Alsea.

Prior to the construction of the N. F. Alsea hatchery and its associated water intake structure (dam) by the Oregon State Fish Commission in 1935, winter steelhead, coho, sea-run cutthroat and lamprey were presumably present in all tributaries above the water intake structure. While spring and fall chinook were present in the main stem of the N. F. Alsea and its larger tributaries, except where natural barriers precluded adult passage. The fish ladder was operational until it was destroyed in the 1964 flood, after which the dam remained as a barrier to upstream fish movement. A few steelhead pass the dam in most years during high flows, and were (and are) the only anadromous fish present above the hatchery dam (House, 1987). Cutthroat and rainbow trout were spread throughout the drainage.

The earliest stream surveys of the Alsea River system were during 1947-1957, including the N. F. Alsea and some of its tributaries (Oakley 1963).



Note: To convert pounds harvested to numbers of fish, divide pounds harvested by nine. For more complete data related to Figure 3.1 see Appendix 3, Tables 1-5.

TERRESTRIAL DOMAIN

Understanding the reference condition for the terrestrial domain of the North Fork Alsea watershed requires an understanding, in a general way, of the range of patterns produced by the physical and biological processes which have been acting on the landscape for the past several thousand years. Included in the reference condition is the influence of native peoples who have lived in or near the area throughout much of this time.

While it is difficult to define one point in time as a "reference condition," it is possible to understand the temporal and spatial scales of the patterns that were produced by processes involving erosion, fire, vegetation succession, and activities of native peoples.

SOILS

Geologic processes at work over the past several million years have produced unique formations in this region of the Oregon Coast Range. Uplifted layers of various sandstones and siltstones along with intrusions of marine basalt have formed the parent material from which weathering and erosional processes have created a variety of soil types in this region. Resistance to weathering by parent materials influences slope gradients and shapes, and has the greatest impact on soils.

Over the past several thousand years, climatic conditions have played the greatest part in influencing the processes affecting soil development. The watershed occurs in a temperature and precipitation zone that favors landslide events (mass wasting) as the most important erosional process affecting soils on hillslopes. Many of the current drainages are stable, but were formed by past mass wasting events over many thousands of years when hillslopes were much steeper. Two types of landslides exist in the watershed: debris avalanches and rotational slumps. Debris avalanches produce the greatest loads of sediment in the watershed. They originate primarily in headwalls, or heads of drainages, on convex portions of resistant parent materials on hillslopes steeper than 60%. Steeper slopes with larger source areas above the headwall typically experience higher failure rates. Debris avalanche events are sudden and are triggered by a rapid increase in precipitation (usually > 5 inches in 24 hours) and/or loss of tree root support resulting from intense fire, blowdown, death or removal of vegetation. The amount of soil area lost is usually less than 0.5 acre. Avalanche materials move into depositional areas along second-or third-order streams. Such materials can temporarily dam streams and influence the condition and functioning of adjacent riparian zones.

Rotational slumps are earth flows that occur over thin bedded sandstone and siltstone. These formations are permeable to water and allow for deep weathering of soil parent material. Slump earth flows are features that can cover many acres of land. They typically form on hillslopes of undulating topography with gradients less than 60%. The process begins by downslope creep of materials which in turn disrupts natural drainage. This disruption increases water saturation in the slide material which accelerates creep rates. Slope failure or slumping is initiated when water pressure and weight of slide materials reaches critical levels. Processes that add water to vulnerable slopes such as heavy precipitation, or reduced transpiration from vegetation as a result of mechanical, climatic, or biological factors (e. g., logging, wind, and disease) will increase sliding hazard. Slump earth flows have a high impact on tree bole straightness and vegetation type. When slumps reach streams, they become a chronic source of sediments.

Concave hillslope positions accumulate materials by dry-raveling, a mechanical process in which materials are detached from the hillslope and move downslope into less concave positions. These materials later become gravelly, highly productive soils. In contrast, convex slopes contain rock outcrops and soils with thin surface layers and shallow depths. These shallow soils support little vegetative cover, and are subject to surface erosion from overland flow. Loss of vegetative cover by fire or harvest increases the erosion hazard.

The cycling of nutrients through the soil is affected by climatic conditions and the growth and decay of vegetation (organic matter). Over the past several thousand years, organic matter has built up and now remains fairly constant over time, except when significant surface soil disturbance occurs. Soils on higher ridgetops (>1750 feet) have lower organic matter levels than at lower elevations. Soil nitrogen levels are maintained by additions through precipitation, nitrogen-fixing plants, and decomposition of organic matter in soil. Soil nitrogen levels can decline after severe fires, or after complete removal of trees, ground cover, and duff, especially if such disturbances occur at relatively frequent intervals (<90 years). Under natural conditions, soil compaction is usually absent, except on some of the more prominent trails (humans and animals).

In general, the soils that have developed within the Coast Range and within this watershed are highly productive, but vary individually in their characteristics, productive capacity, and behavior. The condition of soils on hillslopes is directly related to past disturbance events and the condition of the associated vegetation. This in turn affects the contribution of water and sediments into streams. Natural mass wasting processes continue to occur on even the more gradual hillslopes. The rate of such disturbances has increased in the past several decades resulting from increased human activities occurring within this watershed.

FIRE AND VEGETATION

Fire has been the primary large scale disturbance factor influencing the forest in the Oregon Coast Range. The nature of the Coast Range forests prior to 1900 was largely determined by the intensity, frequency and extent of the natural fire regimes associated with particular areas (Walstad 1990, Agee 1993). The prominence of forests dominated by Douglas-fir in this region at the time of Euro-American settlement was largely due to disturbance by fire for many centuries prior to settlement (Agee 1991).

Natural Fire Regime

The natural fire regime for the northern portion of the Oregon Coast Range is one of severe fire events that were very infrequent, returning at irregular intervals of 150 to 400 years or more (Agee 1981). These intense fires would likely consume several thousand and possibly hundreds of thousands of acres. Generally, individual trees, groups of trees, and even large forest patches would survive these fires, although the distribution of surviving vegetation on the landscape would vary widely. There are many factors that influence how vegetation survives a fire. Among these factors are: pre-fire stand fuel composition; time of day, weather, and micro-climatic conditions at the time of the fire; and local topography. The amount and distribution of this surviving vegetation plays a key role in the rate of reforestation and in the species distribution in the succeeding stand. Following a major fire event, there could be great difficulty in naturally reseeding large areas devoid of a seed source. This has been confirmed in an early USGS report from the Coast Range that states, "Areas are reported which were burned twenty-five to fifty years ago on which there is no vegetation larger than brush and ferns, trees of any species not yet having obtained a foothold" (Gannett 1902).

Very little is known about the frequency and extent of lower intensity fires (referred to as under- burns), in the northern Coast Range (Walstad et al. 1990). Being less dramatic, few detailed historic accounts of low intensity fires exist. Within a few decades following a low intensity fire, there is little definitive physical evidence remaining to help date the occurrence(s) and determine the frequency or intensity of such events.

The influence of on-shore flow of marine air masses creates a predominantly cool and moist climate in the Coast Range. The incidence of lightning strikes in this region is one of the lowest in North America. This prevailing climatic condition is the primary reason for the infrequent nature of both major fires and underburns. It is hypothesized that human-caused ignitions played a more significant role in fire occurrence in the Coast Range when compared with other areas of the state where lightning plays a larger role (Teensma 1991).

Native Americans and Fire

The Native American use of fire in the Willamette Valley is well documented (Boyd 1986, Zybach 1988, Agee 1993). Boyd has reconstructed a probable burning schedule for the Kalapuya:

> In late Spring and early Summer the Indians were probably concentrated at "primary flood plain" sites in the wet prairies where root crops such as camas were collected and processed. There was no burning at this time. During mid-summer (July and August) the focus shifted to the dry prairies, and the "narrow valley plain" sites were more intensively occupied. Burning in July and August was apparently sporadic, most likely occurring after the harvest of seasonally and locally available wild foods (grass seeds, sunflower seeds, hazelnuts and blackberries), in limited areas. The immediate effect of the early burns would be a "cleaning up" process; the long-term result would be to facilitate the re-growth, in future seasons, of the plants involved. In late summer fire was used on the high prairies, as a direct tool in gathering of tarweed and insects. This was followed, in October after acorns had been collected, by firing of the oak openings. Finally, from the "valley edge" sites, the Kalapuya initiated large-scale communal drives for deer, which provided a winter's supply of venison. The sequence ended as they returned to their sheltered winter villages along the river banks.

If late summer and fall fires were ignited prior to the onset of strong east winds, it seems very likely that such fires would have burned up into the higher elevations of the Coast Range (Teensma et al. 1991, Ripple 1994). Pushed by a strong east wind during or following a dry summer, it is not difficult to envision a fire, started at a valley margin site, that carried well into the interior of the Coast Range.

Historic Fire Patterns

Historic fire patterns, and their effect on the landscape pattern of the Coast Range, have become an item of considerable interest to many authors (Zybach 1988, Walstad et al. 1990, Teensma et al. 1991, Agee 1993, Ripple 1994). The information provided by these authors, as well as forest inventory data collected by BLM, allows a picture to be roughly pieced together of how recent historic fires influenced the North Fork Alsea watershed.

A very large wild fire, or series of fires, burned approximately 480,000 acres of the central Coast Range in the period between 1853 to 1868. The Yaquina Fire, as it is called, burned a huge area between present day Corvallis and Yaquina Bay (Gannett 1902, Walstad et al. 1990, Teensma et al. 1991). It is believed that this fire resulted from homesteading activity. The fire burned through most of the western half of this watershed. During that time, it is possible that new starts or holdover fires from a previous year broke out anew in the summer and burned additional acreage (Gannett 1902; Walstad et al. 1990). Historical accounts from the Yaquina Fire period tell of people having to "eat their noon day meals by candle light," "It was dark all over for about 10 days," and "the world in flames" (Zybach 1988). As a result of this fire, the western half of this watershed became forested with a fairly uniform stand of Douglas-fir dating from the 1860-1890 period. There were scattered inclusions of mixed and older stands within this otherwise relatively uniform forest.

In this century, the most significant fire occurring within this watershed started in a logging operation during a period of high winds. The Alsea Mountain Fire (or Old Blue Fire) burned through the central portion of this watershed in 1934, adjacent to and east of the Yaquina Fire area. The total area affected was about 16,400 acres (Siuslaw N.F. FEIS table III-3; *Kingfisher Magazine*, Vol. 1 1979). Across the burned-over area, the intensity of this fire varied from low (underburn) to high (stand replacement). Consequently, some forest stands are diverse and multi-storied in low intensity areas, and are even-aged where the intensity was high and the majority of the trees were killed. Salvage logging removed most of the damaged and burnt timber from this fire by the early 1950s. The approximate boundaries of the Yaquina and Alsea Mountain fires within this watershed are presented in map Appendix 3, Map 1.

It is difficult to determine the forest conditions that existed in the eastern half of this watershed following the Yaquina Fire, since very few of the original forest stands remain. The Alsea Mountain fire spread across some of this area, and extensive railroad logging moved through most of the southeast portions beginning around 1920. The evidence from stumps and the scattered older stands indicates that much of the eastern portion of the watershed was forested in mid-to late seral forest conditions at the time of its harvest. Further field study is needed to determine if the original stands in this area dated to one major event such as the Yaquina Fire, or more likely, if the stands were variable in size, age, and origin. It is probable that the eastern portion of the watershed was exposed to more frequent fires due to its closer proximity to the Willamette Valley, where seasonal burning by the Kalapuyan Indians might be expected to escape the valley margins and burn into the Coast Range in drier years.

At the time of settlement, the N. F. Alsea watershed contained a small amount of oak-grass savanna, as well as grass-fern types. Oak-grass savanna existed in the broader valley bottoms and low hills along the North and South forks of the Alsea River around the town of Alsea. This vegetation association was likely maintained to a large extent through periodic burning by the native people. There does appear to be a link to soils and local climate, as well as to disturbance by fire in the maintenance of the oak-grass savanna type. The grass-fern openings, on the other hand, may have been unforested remnants from previous large fires that had not yet reforested. These openings are generally found higher up in the terrain than the oak-grass type. This vegetation type is less stable and more of a transitional type, moving back to forest in the absence of disturbance. Following settlement, many of these openings were maintained and/or created, for the purpose of livestock grazing, by logging and periodic burning. Interviews with some of the local residents revealed that up through the 1940s it was a fairly common practice to burn off the fern openings to maintain pasturage. Some of these openings are still evident today. Abandonment of open grazing and increased reforestation efforts in recent decades have allowed much of this land to return to a forested condition.

Historic Vegetation Patterns

Insight into long-term historic vegetation patterns of the Oregon Coast Range has recently been provided in a study by Worona and Whitlock (1995). By analyzing the pollen and plant macro fossils contained in the sedimentary layers of Little Lake (located 15 miles south of the town of Alsea, in the upper tributaries of the Siuslaw River), these authors have assessed the vegetation and climatic conditions for the Coast Range for the past 42,000 years. Their work is briefly outlined below:

From 42,000 to 24,770 years Before Present (B. P.) :
- corresponds to the last part of the Olympia non-glacial interval
- climate was cooler and wetter that today
- open forest of western white pine, western hemlock, and true firs

From 24,770 to 13,500 years B. P.:
- corresponds to the full glacial period
- montane forest association develops
- western hemlock, mountain hemlock, pine, and fir are prominent
- Douglas-fir is notably absent from this period

From 13,500 to 10,000 years B. P.:
- initial warming trend in this period featured some temperate tree species including Douglas-fir which becomes a major forest component about 13,500 years B. P.
- a likely cooling trend from 11,000 to 10,500 years B. P.
- western and mountain hemlock, pine, and spruce prominent during cooling trend

From 10,000 to 4,500 years B. P.:
- corresponds to early Holocene period
- Douglas-fir, red alder, and bracken fern are abundant, implying more severe summer drought and frequent fires

- pattern of cool moist winters and drier summers appears after 5,600 years B. P., with Douglas-fir, western hemlock, and western red cedar becoming dominant

From 4,500 years B. P. to the present:

- Douglas-fir, hemlock, and cedar are dominant species
- 2,800 years ago to the present, Douglas-fir increases, while cedar decreases
- past 2,800 years suggest reduced effective moisture in this region

Research by Worona and Whitlock (1995) points to the emergence of the present day western hemlock/Douglas-fir forests in this part of the Coast Range at about 5,600 years B. P. This time line confirms that the ecological processes and disturbance regimes which are characteristic of this major plant community have been operating in this region for several thousand years.

In addition to fire events discussed previously, there were several other natural disturbance factors that affected the vegetation of the Coast Range. Severe wind storms, landslides, insect outbreaks, and disease pockets affected the vegetation at various scales. While the Columbus Day storm of 1962 suggests that wind storms can affect large areas, more often these other disturbance factors had a localized impact on vegetation patterns, and they did not occur as multiple simultaneous events.

Natural Succession of Plants

The natural succession of the plant communities following a disturbance event is dependent on how severe and widespread a disturbance has been. Following severe fires, large patches of the landscape were left completely denuded, often revealing exposed soil. Under such conditions, the succession of plant communities often began with grasses and forbs whose seeds were carried in on the wind. As time progressed, the grass/forb community would usually give way to shrub species and small sapling trees. Most often a young conifer forest would become established and eventually progress to late-seral or old growth conditions before another severe disturbance event occurred. The duration of each seral stage could be quite variable. For example, the grass/forb and shrub community was known to persist for a few decades in certain areas of the Coast Range following the intense fires of the mid-1800s (see above). Lack of a seed source, shrub competition, and reburns have all been identified as factors in delaying the regeneration of disturbed areas to a forested condition (Gannet 1902, Agee 1993).

Successional pathways can be very different following less severe disturbance events. For instance, following a low intensity fire, only shade tolerant species may be able to establish themselves among the surviving vegetation and overstory trees. In contrast to the even-aged stands regenerating after a severe disturbance, stands that develop following less intense under-burns often have multiple canopy layers and more structural diversity. Local site conditions such as soil conditions and available moisture will also affect the successional pathways of plant communities following a disturbance.

For several thousand years, the western hemlock/Douglas-fir forests of the Coast Range have been dynamically responding to both large-scale and localized disturbance events. The condition of the vegetation occupying the landscape at any one time could therefore be quite variable. The enormous acreages affected by major fire events could far surpass the size of any single watershed. Considering this fact, it is easy to conclude that forest conditions within a watershed could naturally have ranged from completely burned over to completely covered in late seral forest conditions. We know from reconstruction of historic forest inventory records (Teensma, et al. 1991), forest vegetation potential (Franklin and Dyrness 1973), and fire return intervals (Agee 1993) that on average, late seral and old growth forests occupied 60% to 80% of the Coast Range landscape. Ripple (1994) estimated that 61% of the Coast Range was occupied by late seral forests prior to 1840. In contrast, perhaps 20% to 40% of the Coast Range was typically in early seral conditions, resulting from recent fires or localized disturbances. Keeping in mind, on a relatively small scale such as a watershed, the range could well have fluctuated from 0% to 100% at any particular time.

Special Habitats

Ecological and physical processes produce special habitats within the forest. These processes include the following disturbance regimes: patch and gap dynamics; hydrological cycles; geomorphic and erosional processes; nutrient cycles; energy flows; biomass and resource productivity; vegetation mortality and regeneration rates; herbivory, parasitism, and predation rates; colonization and local extinction; and others. The ecological and physical processes that operated in the past to produce these habitats are presumed identical as those that currently produce these habitats. Special habitats indicate the potential health of special habitat-dependent species, and are closely related to the continued existence of these species. The rate, location, extent, and intensity of natural and induced environmental stressors affect special habitats, and can make their status more or less secure. These stressors include: fire frequency, intensity, and spatial patterns; air and water pollution; climate change; exotic species; large-scale fire frequency and intensity; fire suppression strategies; insect epidemics; floods; road densities; extent and intensity of silvicultural treatments; habitat simplification; siltation in key watersheds; fragmentation and loss of habitat corridors; and secondary effects of restoration activities.

Wildlife Species and Habitat

The vegetation that defines a watershed is also most responsible for defining the wildlife species that can be found in that watershed. Each plant community and its stand characteristics create distinct environmental conditions that fulfill the habitat requirements of certain wildlife species. Based on an understanding of the reference conditions for vegetation, assumptions can be made about the existence and prominence of various wildlife species and their populations.

Historical accounts of the earliest explorers and settlers shed some light on the more notable species. For instance, the journals of David Douglas (1972) reveal that grizzly bears, Columbian white-tailed deer, and California condors were occasionally encountered in the Willamette Valley and central Oregon Coast Range. These species have since become extinct or extirpated from this area. There is also evidence that the Alsea Valley supported stable herds of elk and deer which attracted Indians and early settlers. However, what species were historically present and how their populations may have fluctuated must be inferred based from the spatial and temporal scales of vegetation patterns.

At the scale of the Coast Range Province, it is likely that when major disturbances occurred, such as the Yaquina Fire, the remaining patches of late seral vegetation would function as refugia for those species which are closely associated with such habitat. In contrast, species associated with early successional stages would have flourished for a time immediately following such a disturbance. With the fire-return interval approaching 400 years or more, the vegetation between the unburned patches would have ample time to recover, and those species associated with late seral conditions would then be able to disperse out of the refugia and repopulate the recovered forest. The populations of wildlife species associated with late seral forest and species associated with early seral conditions would alternately have ebbed and flowed as the seral stages naturally shifted in response to succession and disturbance.

Even when late seral forests dominated a watershed, it is likely that other seral stages would still be present at some level within the watershed or in adjacent watersheds due to the ecological processes described above. Therefore, a variety of wildlife species associated with other seral stages and special habitats would also likely be present in the watershed. At the province scale, the most prominent and longest lasting habitat available to wildlife species through time was likely late seral forest due to the long duration of this stage and the long fire-return interval. Thus, it is logical to expect that the Coast Range would support a stable and diverse assemblage of late seral associated species.

Large-scale disturbance processes would have minimized the ratio of high contrast edge lengths to late seral patch areas, and would have left large amounts of down wood and standing snags across the landscape. The more frequent small-scale disturbances (localized blowdown, landslides, insect kills, and disease pockets) would leave canopy gaps within the recovering forest patches. These processes, along with individual site conditions (microclimate, elevation, slope aspect), would contribute to the development of several important structural features for wildlife such as down wood, standing snags, and multiple canopy layers which include a highly diverse herbaceous layer in canopy gaps. The presence of these structural features is important to many animals by providing resting and nesting sites, protection from predators, food, and thermal protection; it is essential for certain species to be present in a stand. Down wood is also critical for many species of vascular plants, fungi, liverworts, mosses, and lichens which provide food for certain wildlife species.

Special habitats such as caves, cliffs, talus, exposed rock, and grass meadows are important to wildlife. (See discussion above on the processes which creates special habitats.) Indeed the presence of some wildlife species is dependent upon the existence and extent of such habitats. Natural processes continually reduce these habitats through time, moving them ecologically in the direction of the adjacent plant communities. Yet, as noted above, other natural processes such as fire, disease, and wind produce and help maintain these habitats.

While the diversity of wildlife species and their populations has likely fluctuated over the past several thousand years, there existed certain patterns which favored some species more than others. The response of wildlife species to these processes and resultant patterns would be quite variable. The larger vertebrates and most bird species are usually excellent dispersers enabling them to repopulate distant forest patches following disturbances, or conversely, allowing then to use widely separated early seral patches as natural succession moves the landscape toward late seral conditions. For smaller vertebrates and some invertebrates (e. g., flightless insects and mollusks) adequate corridors of suitable habitat are necessary to allow for dispersal from one suitable patch to another. As noted above, species adapted to late seral forest conditions would have likely enjoyed the most often abundant and longest lasting of the available habitats. The populations of early seral and edge contrast species (e. g., early seral adjacent to late seral habitat) would have gone from "boom to bust" relatively quickly as early seral habitats usually developed into subsequent seral stages within a few decades following a major disturbance. Species adapted to unique habitats, especially the higher elevation habitats, have likely been steadily declining through time due to natural successional processes.

Chapter IV - Current Conditions

Introduction

The processes described in the previous chapter, "Reference Conditions," have acted over time in the North Fork Alsea River Watershed to create the landscape encountered there today. The present chapter will provide information known now about conditions which exist in the watershed, with particular emphasis on those existing on BLM lands. While some data are missing or incomplete, it is hoped that a sufficiently complete set of data and information is expressed here to serve as a sound basis for interpretation (Chapter 5) and then later (Chapter 6) for management recommendations.

Human Domain

Commodity Forest Products

The BLM manages 20,083 acres (48%) of the 41,868 acre N. F. Alsea watershed. The Northwest Forest Plan and Salem District RMP designate three land use allocations (LUAs) for the N. F. Alsea watershed. These LUAs impact directly the amount and type of timber and Special Forest Products that can be harvested years while still supporting the goals set for other resource values.

The objectives for each LUA are based on traditional or experimental management and silvicultural practices which will be necessary to attain the conditions desired for each LUA. The following is a discussion of LUAs and management implications for each in the N. F. Alsea watershed:

1) Late Successional Reserves (LSRs) are federal lands managed to protect and enhance late successional and old-growth forest ecosystem conditions and to provide potential habitat for species dependent on these types of ecosystems (RMP 1995). Experimental harvest or other management practices may be necessary here to attain the conditions desired for this LUA. Including USFS lands, there are approximately 16,571 acres designated as LSR in the watershed.

2) Matrix lands are managed to produce a sustainable supply of timber while also providing connectivity between LSRs, a variety of habitat and ecological functions, and early successional habitat (RMP 1995). Traditional harvest and management practices may be necessary here to attain the conditions desired for this LUA. There are approximately 4,694 acres of federal ownership (including USFS) designated as Matrix in the watershed.

3) Riparian Reserves are managed to meet Aquatic Conservation Strategy objectives. Experimental harvest and management practices may be necessary to restore and maintain the health of Riparian Reserves; Riparian Reserve is an LUA designation that overlays all other LUA designations. There are approximately 13,389 acres of federal ownership designated as Riparian Reserves in the watershed.

Another element of the Northwest Forest Plan and Salem District RMP (1995) is the "15% Older Forest Retention" requirement: the RMP requires retention of additional late-successional forest patches whenever less than 15% of the federal ownership within a watershed is in timber age classes which are 80 years old or older.

Matrix Lands

Regeneration harvest will occur exclusively on Matrix lands in the watershed, and the RMPs 15% Older Forest Requirement is an overriding restriction which could limit the amount of acreage available for such harvest. However, the N. F. Alsea watershed has approximately 5,871 acres (28% of the federal land) in timber that is 80 years or older, including LSR lands and reserved areas in the Matrix lands. Thus, the watershed has significantly more acreage than necessary to meet the 15% older forest requirement.

Using the following criteria, GIS analysis determined the acres potentially available for regeneration harvest on Matrix lands: 1) stand age = 60+ years; 2) contains conifer; and 3) outside Riparian Reserves. This analysis identified 167 acres which met these criteria (see Appendix 4, Map 1); most of this acreage is located in the Crooked Frontal sub-watershed.

Further analysis using the same criteria, except for changing stand age to 50-60 years, identified an additional 316 acres of land that will be potentially available for harvest within the next 10 years (see Appendix 4, Map 2). Most of this is located within the Crooked Frontal and Upper-Crooked sub-watersheds. (Note: a considerable portion of this acreage will be commercially thinned in the Crooked Creek and Earnest Creek timber sales. Where these commercial thinnings take place, it will be desirable to wait past the 60-year stand age to conduct regeneration harvests.)

GIS analysis also determined the potential acreage available for commercial thinning on matrix lands using the following criteria: 1) stand age = 21-70 years; 2) 40% and greater stocking[5] ; 3) contains conifers; and 4) outside Riparian Reserves. The analysis indicated that 1,470 acres are available for harvest (see Appendix 4, Map 3).

Calculating the acreage of stands that are less than 20 years old, there are potentially 310 acres available for *precommercial* thinning on matrix lands in the next ten years.

The same analysis for land inside Riparian Reserves indicated that an additional 2,136 acres are potentially available for density management. As previously noted, thinning here could be conducted only if it can be demonstrated that they would meet the objectives of the Aquatic Conservation Strategy.

Applying the same criteria, except for changing stand age to 10-20 years, provided a forecast of future potential *commercial* thinning opportunities (see Appendix 4, Map 4). Within 10 years, there will be an additional 128 acres inside and 137 acres outside Riparian Reserves available potentially for commercial thinning and\or density management.

5 Based on forest inventory data, this Watershed Analysis team determined that any stands that had stocking levels greater than 40% as stands potentially available for thinning.

Late Successional Reserve (LSRs)

Evaluation of LSRs identified areas where density management treatments, which manipulate stand stocking levels, may be used to provide or enhance late successional forest ecosystem conditions.

Areas with a high level of stocking and a lack of structural diversity were identified. Density management of these stands can produce a stand that is more structurally diverse, has larger trees, more down woody material, and additional small openings. This creates more old-growth stand structure faster than when stands are left alone.

GIS analysis was done on stands which are 20-80 years old, have Douglas-fir at a stocking level of 40% or greater and a single story (see Appendix 4, Map 5). Such stands were both inside and outside Riparian Reserves. Outside of the Riparian Reserves, 1,895 acres were found which may be suitable for potential density management projects; 2,986 such acres were found which lie inside the reserves.

Applying the same stand criteria, except changing stand age to 10-20 years, provides a forecast of future density management opportunities (see Appendix 4, Map 6). Within 10 years, there will be potentially an additional 807 acres inside and 472 acres outside Riparian Reserves available for density management.

Special Forest Products

Special Forest Products (SFP) is the term now used to describe what was formerly referred to as "minor forest products." SFPs are limited to vegetative material and include such items as grasses, seeds, roots, bark, berries, mosses, ferns, edible mushrooms, tree seedlings, transplants, poles, conifer boughs and firewood. The top four SFPs extracted from the N. F. Alsea watershed, based on volume and monetary value, are conifer boughs, firewood, ferns and mosses.

Management of SFPs is an important component of ecosystem-based resource management. An effectively managed SFP program benefits both the BLM and the public interests in many ways.

Such a program can: complement other resource programs managed by the BLM; contribute to the economic stability of local communities; resolve some of the conflicts created by increased commercial and recreational harvesting of these forest products; develop baseline inventory data for species now in demand; form partnerships with groups concerned with the harvest and management of these products; and educate the public as to the value of natural, renewable resources.

In recent years the Salem District has experienced an increase in interest and demand for all SFPs offered for sale on the district. Conversations with purchasers and local marketing companies indicate that this trend will continue.

Transportation

The transportation system in the N. F. Alsea watershed is primarily a network of discontinuous roads; most are surfaced with crushed rock, and many originate from State Highway 34. Ownership of these roads is as follows: 149 miles are controlled by private landholders (timber and farming); 104 miles by the BLM; 5 miles, USFS; and 2 miles, Benton County (see Appendix 4, Table 1). Paved access roads are controlled by the State of Oregon (9 miles), USFS (4 miles), and Benton County (1 mile). Unsurfaced roads account for only 9% (28 miles) of the total transportation system in the watershed; of these, 19 miles are controlled by BLM while the remaining 9 miles are under private control. The USFSs paved Mary's Peak access road provides primary access to the watershed from the East, BLM's North Fork Alsea access road is a gravel road that provides access from the northwest, and access from the southwest is via BLM's Mill Creek/Easter Creek gravel roads.

BLM roads are classified as "primary," "secondary," or "local." Primary roads provide continuous access, and link to state highways or county roads. They consist of paved or gravel surfaced roads and are maintained continuously for all users. Primary roads carry mixed timber and recreation traffic, and so they have turnouts or are wide enough to allow vehicles meeting each other to pass. Secondary roads are similar to primary roads except that they are usually not continuous (I. e., they may lead to dead ends), and are generally one-lane gravel surfaced roads with turnouts. These roads usually link local and primary roads, and are maintained annually or during periods of use for timber haul. Local roads connect terminal facilities such as log landings and recreation sites with primary or secondary roads. Most local roads are gravel or unsurfaced one-lane roads that extend less than a mile long and were built to serve a single purpose. Maintenance on these roads is performed by the user (e. g., a logging company when hauling logs) or by BLM for special recreation needs.

Although roads in this watershed are generally open to vehicular traffic, guaranteed public access is limited to those state, county, and federally-controlled roads that connect without crossing private lands, unless an exclusive easement is acquired.

There are very few gates or barriers that limit access within the boundaries of this watershed. Approximately 81 miles of BLM-controlled roads are encumbered by access documents (Reciprocal Agreements and Non-exclusive Easements) with private landholders. Management of BLM and privately-controlled roads that are located on lands covered by these documents must be agreed upon by both parties.

According to field inventories, approximately 10% of all BLM-controlled roads in the watershed are closing naturally (revegetating) due to lack of use. Maintenance on the majority of roads in this watershed has traditionally been accomplished by BLM maintenance crews on BLM-controlled roads, and by private contractors on privately-controlled roads. Roads are generally only maintained during periods of use. During the late 1980s, the BLM maintenance program began to experience a reduction in operating funds due to the decline of federal timber harvest revenues. As this trend continues, the condition of BLM roads is deteriorating, and only main roads providing access to private timber harvest operations are being maintained adequately. Recent severe winter storms and floods have increased the likelihood that roads in need of maintenance or repair will experience subgrade, fillslope, or drainage structure failures.

Many roads in this watershed are aging and beginning to experience problems. For example, raveling of cut-slopes into ditches and road surfaces is common, some fill slopes on steep hillsides have slid down-slope, and other earth fills are eroding from poor culvert installations or lack of maintenance. In several locations, drainage structures (culverts) are deteriorating and beginning to fail, causing roads to settle or collapse. Also, many culverts in perennial and intermittent streams are too small in diameter, causing them to plug easily and water to flow over the road during major storm events. Several local and some secondary roads that have not been used recently are now revegetated and largely inaccessible; some of these still have drainage structures in place that could fail and cause downstream sedimentation. (Note: As this is being written, damage from the February, 1996, floods is being assessed and numerous problems with roads and associated structures [bridges, culverts, etc.,] are being documented.) Unsurfaced roads in the watershed south of Hwy. 34 are used extensively by motorcycles; many of these old roads are overgrown and no longer accessible to standard vehicles. Some stream crossings are being severely impacted by motorcycles creating ruts that cause erosion and sedimentation while other trails are steep, and traverse into and across streams creating the same results.

Recreation

Recreation Resource Areas

There are three primary BLM recreation resource areas in the watershed: on Mary's Peak, along the North Fork of the Alsea River, and in the Greasy Creek/Gleason Creek area. The first of these, Mary's Peak, is the highest point in the Oregon Coast Range, and is characterized by slopes with mature conifer forest, clear mountain streams which drain these slopes, and a paved road to the top whose open vistas make the peak a popular recreation attraction. Its height provides spectacular views of the Willamette Valley to the east, the Pacific Ocean to the west, and the Cascade peaks to the northeast, east and southeast.

The Forest Service and BLM own 18 contiguous sections on Mary's Peak. In recent years, BLM planners and the trail enthusiasts advising them have focused on a range of high value attractions (loop-trails and overnight accommodations) that could be developed on BLM land as links to the Forest Service's existing trails for equestrians, mountain bikers, and hikers. Eighty-five per cent of all the new recreational development which has been proposed in the Salem District RMP (1995) for the Marys Peak Resource Area are on BLM lands within the North Fork Alsea River Watershed.

A 120-acre grass bald and the surrounding noble fir forest at the top of the peak have been designated by BLM as an outstanding natural area and by the U. S. Forest Service as a scenic botanical special interest area. The combined size of these two areas is about 1,030 acres. In addition, some 2,300 acres of BLM-administered land on the peak are designated as a special recreation management area. The Forest Service manages the land below 3,000 feet for recreation in a relatively natural setting, and forest roads throughout the watershed provide public access to sizable tracts of public land.

The North Fork of the Alsea River has scenic qualities which vary from dense mature forest to steep rocky outcrops descending into the river. Timber management activities have created moderate impacts along the upper and lower stretches of the river, but the character of the river corridor changes near the middle of river as it descends into a deep, isolated canyon. The river was considered for national designation as a scenic river, but it did not meet management suitability criteria. However, it is considered an integral part of the Mary's Peak Special Recreation Management Area.

BLM's proposed Greasy Creek/Gleason Creek off-highway vehicle use area, in the southeastern part of the watershed, is used extensively for dirt bike riding. Roads and trails on both public and private property are used for this activity. Outside of the Greasy Creek area, no trails have been specifically designated for these activities nor have any facilities been provided to support motorcycles, OHVs or mountain bikes. Similarly, no trails have been specifically designated for equestrian activities nor have any facilities been provided to support them.

Use of non-designated trails and roads by horses, motorcycles, OHVs and mountain bikes have caused problems of user conflicts and of degradation of trails with accompanying erosion.

Federal Recreation Developments and Improvements

BLM has no developed recreation sites (e. g., campgrounds, picnic sites, rest rooms), parking areas or trails in the watershed. Portions of BLM's network of roads, both active and unused, and trails blazed independently by recreationists are used for a variety of activities, including but not limited to snow play, cross-country skiing, hunting, angling, non-commercial gathering of forest products (e. g., mushrooms, bear grass), and horseback riding. Potential developments identified and allocated through the Salem District RMP (1995) are shown in Table 4.1.

The Forest Service and BLM have promoted recreational driving on the Mary's Peak Access Road to an observation area near the summit. Along the way, panoramic vista pull-outs with interpretive panels are provided for visitor enjoyment and education.

The Forest Service operates and maintains the following recreation facilities on Mary's Peak:

Mary's Peak Campground and Picnic Area - a 10 unit campground which accommodates 50 people.

Mary's Peak Observation Site - a three-acre parking and picnic area accommodating 120 people.

Connors Camp - a one-acre paved parking area, a trailhead for the East Ridge Trail, and a comfort station.

Yew Creek Road Wayside - a one-acre parking area adjacent to Mary's Peak Access Road.

Mary's Peak Wayside - a two-acre paved parking and picnic area at the junction of the access road and Highway 34.

Summit Loop Trail, Meadow Edge Trail, and East Ridge Trailhead - these facilities provide 10-to-12 miles of hiking trails.

Table 4.1: Potential BLM Recreation Developments in the North Fork Alsea River Watershed

Site/Trail	Location	Acres/ Miles	Development Potential	Management Restrictions
Parker Creek site	3 miles west of Mary's Peak	87 ac.	Camping area	No timber harvest (with minor exceptions) No mineral development
Dick's Ridge site	3 miles west of Mary's Peak	35 ac.	Camping area (equestrian); trailhead	Same as Parker Creek
Corvallis-to-the-Sea Trail	Running NE to SW across Mary's Peak	30 mi.	Hiking/bicycle/ horse trail	Meet LSR objectives
Mary's Peak (Circumpeak) Trail	Loop: from N of Mary's Peak W, then S, then E to due S of M.P.	3 mi.	Hiking trail	Meet LSR objectives
North Fork Alsea Trail	Complete loop, 5 mi. SW of M.P.	9 mi.	Hiking trail	Meet Aquatic Conservation Strategy objectives

Federal Land Recreation Use and Visitor Estimates

Recreational use of BLM-administered land in the watershed is estimated at 43,000 visits per year. All of the dispersed recreational activities mentioned in Chapter 3, including snow play and cross-country skiing, occur on BLM lands. Most visitors reside in the Willamette Valley, the Oregon Coast Range, and the Oregon Coast, with State Highway 34 providing all-weather access to and through the watershed. General recreation is concentrated from mid-May to mid-September although hiking and dirt bike riding occurs year-round; hunters use the area from September through November.

Due to limited physical access, the N. F. Alsea River itself is a very lightly used recreation resource. There are no trails along most of the river, and hiking is difficult. Fishing from spring through fall is the primary recreation use of the river.

BLM's proposed Greasy Creek/Gleason Creek off-highway vehicle use area already has an estimated annual dirt bike use of approximately 6,000 visits on both BLM and private roads and trails, and most of the use occurs within a four-mile radius of Flat Mountain. Starker Forests, Inc., manages this use by requiring each motorcyclist to obtain a work/ride permit prior to any use of their forest roads and trails: motorcyclists must volunteer for trail maintenance or erosion control projects if they expect to ride in the area. BLM is not actively managing this use on its roads.

In recent years, Forest Service and BLM-administered lands on Mary's Peak have attracted over 100,000 recreation visits per year. The majority of the visits are for sightseeing, driving for pleasure and picnicking. About 40,000 visits per year are attributable to winter sports while hiking accounts for about 10,000 visits annually. Forest Service trails on Mary's Peak range from moderately easy to moderately difficult hikes; the trails are limited to hikers, although some mountain bike activity has been observed. Trail use exceeds 10,000 hiker visits annually, and most of this use occurs near the summit observation site and parking-lot. The "Friends of Mary's Peak" have given numerous guided walks and talks to groups hiking on the peak.

The Forest Service manages a winter play area on Mary's Peak because it receives significant persistent snow at the upper elevations. Winter recreational use begins in mid-November and ends in late March. The Forest Service plows the access road to the summit to accommodate winter visitors, and parking areas along the Mary's Peak Access road are included in the state's Snowpack permit system. Winter activities include cross-country skiing, snowshoeing, sledding, inner tubing, and other types of snow play.

Two organized recreation events occur on Mary's Peak by special use permit. In May, the Acacia Fraternity Run attracts 1,000-1,200 people for a running relay race which begins in Corvallis and ends at the upper parking lot. In August, the first two miles of the Mary's Peak road are used for an auto race hill climb which attracts 350-500 people and 30 race cars.

Miscellaneous

Current records indicate there are no known active oil or gas leases or mining claims within the watershed. Rock quarries were developed to provide road surfacing material to roads in the watershed; there are only three known quarries on BLM land with two being active. Impacts to adjacent resources are always reviewed, the NEPA process is followed if expansion is necessary, and mining laws and regulations followed prior to any extraction from these quarries.

Aquatic Domain

The aquatic ecosystem in the North Fork Alsea River watershed is formed by the interactions between its physical and biological processes, along with interactions with the terrestrial environment.

Physical processes form the foundation of the aquatic ecosystem. Geologic factors such as land forms, climate, and soil types define many of the characteristics of the stream network. Geology shapes the drainage patterns, determines the type of sediment available to streams, and influences water chemistry. Climate, on the other hand, controls the amount and timing of precipitation and streamflow patterns. The types of soils present influence water infiltration rates, erosion potential, and vegetation.

Biological processes include the aquatic organisms present, food chain interactions, and nutrient cycling. Within anadromous streams, the amount of nutrients available is often related to the size of the fish populations. Ocean conditions, predation by marine animals, fishing mortality, and other factors outside of the watershed exert a strong influence on fish populations in it.

Physical Processes

Stream Flow

The North Fork Alsea stream flow was recorded from 1957 to 1989 from a gauge at river mile 29.4, near the town of Alsea (USGS 1984). For the period of record (1957 - 1982), the average annual water yield for the N. F. Alsea watershed was estimated at 203,600 acre-feet per year. Over 50% of the annual flow came in the months of November though February. Monthly mean flows ranged from a low of about 12 cubic feet per second (cfs), occurring in late summer, to a high of 285 cfs during typical winter months. Maximum monthly flows generally occurred during the months of December, January, and February, with a second peak, associated with spring snowmelt, occurring in April. Extreme flows for the period of record ranged from a low of 8.3 cfs on Sept. 19, 1979 to an instantaneous peak flow of 14,100 cfs on December 22, 1964 (USGS, 1984).

Peakflow

Significant flood events have occurred historically on a fairly regular basis throughout the coastal region (Bodhaine 1961). The most dramatic and well-documented flood event in the recent past occurred on December 22, 1964, with an estimated maximum discharge of 14,100 cfs. **(As this is being written, impacts from the February, 1996, flood are being assessed).** Approaching the estimated 100-year frequency, this event triggered road and hillslope failures (see Soils section of this report) and channel adjustments in the North Fork Alsea watershed. This was followed by a somewhat smaller flood in January 1965, see Figure 4.2 .

Figure 4.2, displays the instantaneous maximum and minimum discharges, annually, measured for the North Fork Alsea at the USGS gauge near the town of Alsea from 1957-1989. Table 2 in Appendix 4, summarizes all of the two-, five-, twenty-five-, and fifty-year high flow events that were recorded at this station from 1957-1989.

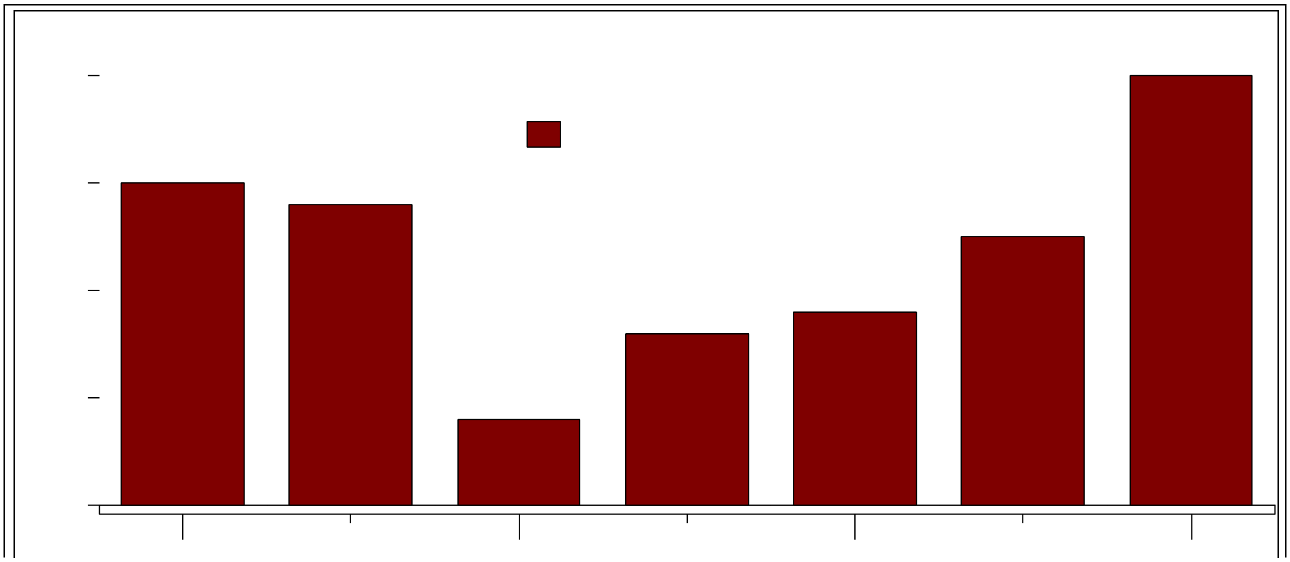
Figure 4.2 North Fork Alsea Annual Instantaneous Discharge Maximums and Minimums

Figure 4.3 displays the unit peak flow (instantaneous peak flow for a ten-year event per unit area) for the North Fork Alsea, and compared to the mean unit peak flow in North Coast Range watersheds and other regions of the Pacific Northwest (from Frissell 1992).

Unit Peak Flow describes the intensity of storm events as a ratio that can be compared across regions or watersheds. Unit Peak Flow in the North Fork Alsea (1.41) is slightly higher than the regional mean 1.4 .

Overall, watersheds in the North Coast Range (including the North Fork Alsea) are second only to the Klamath Mountains of southwest Oregon and northwest California, a region notorious for the intensity of its peak flow events. Unit Peak Flow has been correlated with stream channel instability and failure rates of in-channel fish habitat enhancement projects (Frissell 1994).

Figure 4.3. Regional Comparison of Unit Peak Flow with the North Fork Alsea



Transient Snow Zone and Peak Flows

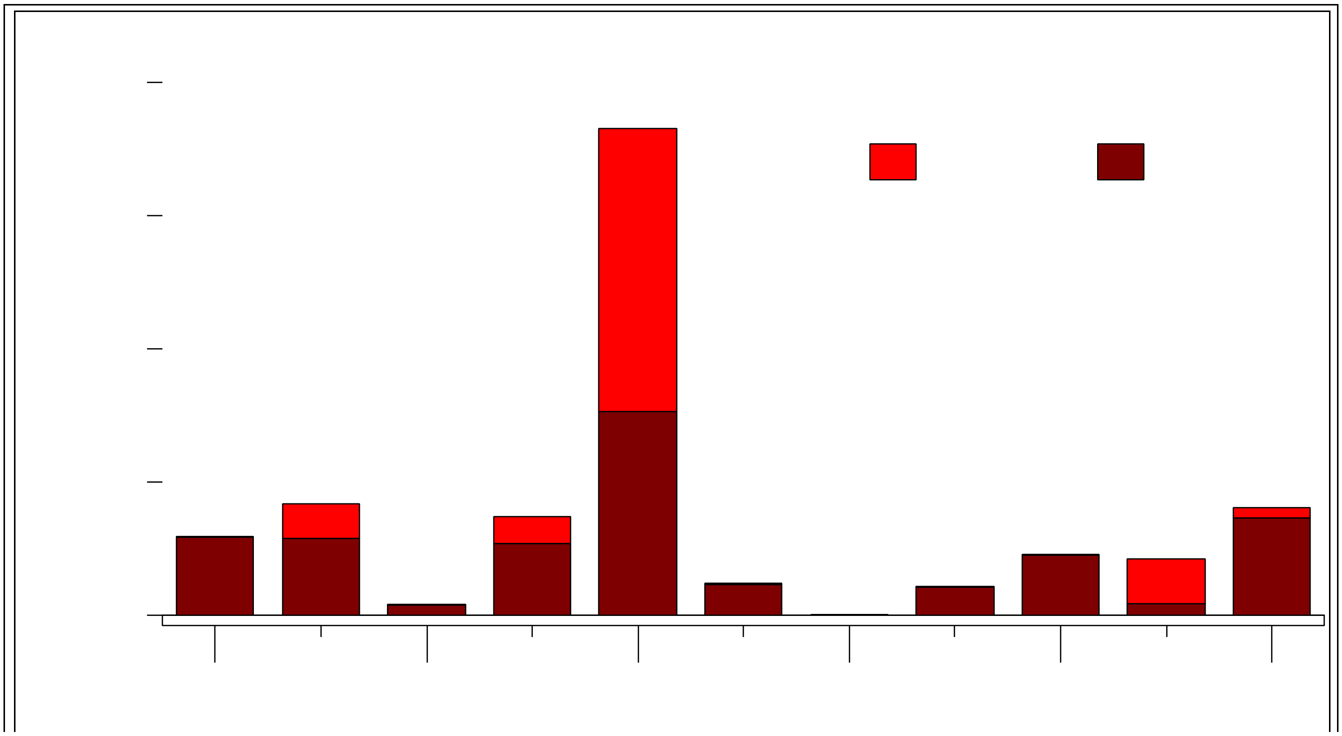
North Fork Alsea watershed flood events are similar to other documented floods in the region. These peak-flow events occur during the rainy season, following a rapid and substantial depletion of the snowpack during a prolonged rain-on-snow period in the "transient snow zone" (TSZ). The North Fork Alsea TSZ is estimated to occur above 1,800.

Approximately 9,979 acres (24%) of the North Fork Alsea watershed lies within the TSZ. Parker, Yew, Crooked, and Easter sub-watersheds have 7,728 acres (83% of the total) in the TSZ. In these sub-watersheds there are 2,393 acres (31%) of TSZ that is also on terrain at high risk for mass wasting. Road construction and clearcut harvesting in these areas puts adjacent stream channels and their associated aquatic resources at higher risk because snow accumulates to greater depths in harvest areas and roads, and melting snow increases the magnitude of peak-flows during rain-on-snow events. The resulting higher flows may scour, downcut or widen stream channels. Sudden, large increases in rainfall and snowpack runnoff can precipitate landsliding on terrain prone to mass wasting.

Many of the large mass wasting events from the 1964 flood in the Parker and Yew Creek sub-watersheds are associated with road construction and harvesting in the TSZ at risk for landsliding (see Soils section of this report).

Figure 4.4, displays the acreage, by sub-watershed, of area in TSZ and High Precipitation Zone (HPZ; by definition: an average of 100-150 inches of precipitation/year). The HPZ is primarily on the steep southern slopes of Mary’s Peak in the headwaters of Parker Creek; this area receives high intensity rainfall in great quantities as storm fronts lift and cool to pass over Mary’s Peak. The overlap areas between TSZ and HPZ are particularly vulnerable to extremes in storm events, and represent areas of high risk for road construction and timber harvest. Parker Creek, Easter Creek and Upper North Fork sub-watersheds account for the vast majority of this zone. Roads in this area (18.5 miles in Parker, 4.9 in Easter) are high priority for decommissioning, see Appendix 4, Map 7.

Figure 4.4. Transient Snow Zone and High Precipitation Zone



Roads and Peak Flow

Roads affect peak flows by “capturing” rainfall and snow, and quickly routing runoff into streams. Road ditches function as "extensions" of stream channels, increasing overall drainage density, and transporting water more rapidly than natural processes (Wemple 1994). High road densities significantly increase the amount of water delivered to surface streams, altering the timing and magnitude of peakflows. Roads also encroach on stream channels, riparian areas, and flood plains, continuing and straightening channels and rerouting streams during flood events.

Figure 4.5, displays road densities for the watershed. The N.F. Alsea watershed has 302 miles of road for a total (Federal and private) road density of 4.77 mile of road/sq. mile of surface. The BLM-controlled roads in the watershed have a density of 1.8. Highest road densities, per square mile, occur in the Upper N. F., Ryder, Seely, Racks, and Easter sub-watersheds (5.8, 5.8, 5.4, 5.4, and 5.35, respectively). Easter sub-watershed not only has a high road density, but also has the highest proportion of TSZ (71% of the sub-watershed).

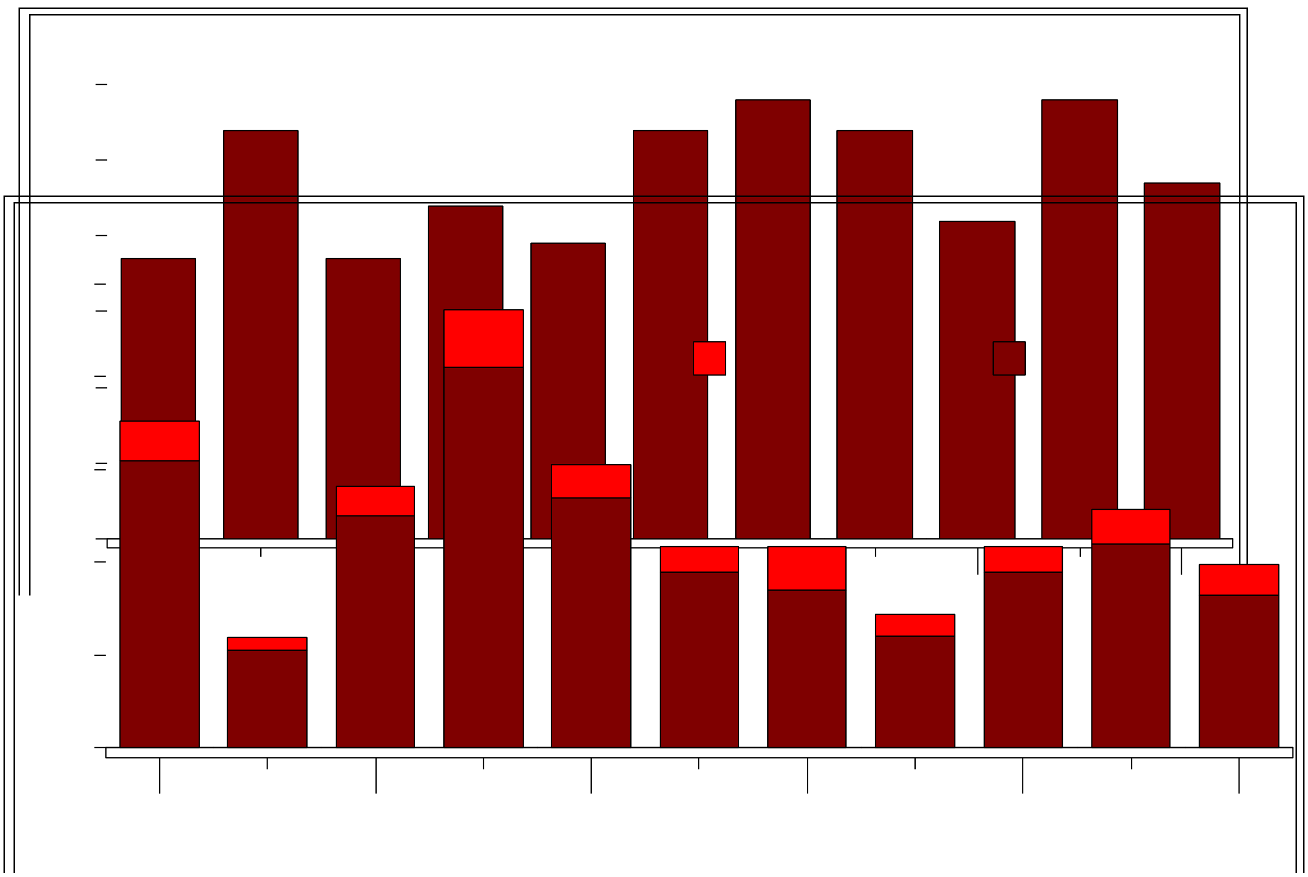
Sub-watersheds with the highest linear road mileage include, the Lower North Fork, Ryder, Upper North Fork, and Parker sub-watersheds (48, 36, 35, and 33 miles, respectively). A total of 75.4 miles of road (25% of total road length) is currently located within riparian zones (based on interim riparian widths) on BLM lands in the N. F. Alsea. The Aquatic Conservation Strategy requires that these roads be closely evaluated in terms of their impact on aquatic functioning; these sections of road are candidates for closure/decommissioning (see Roads Management in this report). A total of 44 miles of road (15% of total road length) are currently located on high risk landslide terrain in the N. F. Alsea. These sections of road on BLM have been inventoried and evaluated as candidates for closure/decommissioning (see Roads Management in this report).

Roads and Extension of the Stream Network

Mechanisms of channel extension include the capture and routing of precipitation and snow melt from compacted road surfaces to streams, and the interception of groundwater at road cutbanks and subsequent routing to streams.

Analysis of roads and stream crossings with regard to the expansion of the channel network indicates that effective channel lengths appear to have increased by 76.5 miles (15% overall within the N. F. Alsea) (see Figure 4.6).

This is a conservative estimate compared to the overall 57% increase in effective stream length measured in a study on forested lands in the Cascades (Wemple 1994). Confidence in this estimate is low due to the use of a generalized factor (400 ft. extension/stream crossing), and the lack of field verification.



Nevertheless, it is reasonable to expect that increases in peakflows attributable to increased road density and expansion of the drainage network may have occurred in the N. F. Alsea watershed. It is generally accepted that elements of stream channel morphology (stream channel dimensions and characteristics) are adjusted to accommodate the bankfull (1.5-year) storm event in lower gradient streams (Wolman and Miller 1960). The 5-year flow event has been suggested as the "channel-forming" flow most affecting steeper mountain streams (Lisle 1981) such as the N. F. Alsea and its tributaries. It is reasonable to conclude that channel-forming peakflows (2-year, 5-year, 10-year events), and therefore unit peak flow, have been increased over natural levels in the North Fork Alsea, the implications of which are discussed in sections which follow. It is also reasonable to infer that less frequent, longer return interval floods

(25-year, 50-year, 100-year, etc.) are less affected by management and are more reflective of the specific climatic event causing or contributing to the stream discharge.

Baseflow

Low flows ranging between 8 cfs and 13 cfs have been recorded at the USGS gauge on the North Fork Alsea. Recent research (Hicks et al. 1991) suggests that reductions in streamflow following timber harvest may be related to the regrowth of deciduous riparian species which transpire larger quantities of water than the later successional conifer vegetation. As a result of disturbances (forest management and natural) in the NF Alsea, approximately 44% of riparian reserves are in an early seral stage vegetation type (< 40 years old), largely dominated by deciduous (see Riparian Vegetation section of this report). This may have contributed to decreased baseflow, but there is no evidence available to verify this. It should be noted that stream gaging data was collected from 1957-1989 and does not reflect pre-management conditions. Reduced baseflow in the North Fork Alsea could also have occurred as a result of the extensive channel scour, down-cutting, and abandonment of former flood plains in the lower mainstem of the river (see Stream Channels section of this chapter).

Stream Channels

Channel Morphology and Classification

Stream morphology is influenced by eight factors which change over time: channel width, channel depth, water velocity, discharge, slope of the stream channel, roughness of the stream bed, amount of sediment, and size of sediment (Leopold et al. 1964). In addition, streambank vegetation influences streambank stability. All of these factors interact with each other; a change in one can result in an adjustment by any or all of the other factors. For example, an increase in the amount of sediment may cause the stream channel to fill with sediment (aggrade), which in turn may cause channel widening. Alternatively, an increase in discharge may cause more sediment to be transported. The streambed is scoured, and the channel may downcut. Specific factors which influence the streams in the N. F. Alsea are discussed below.

As a first step in stratifying the stream network and to differentiate between reaches, the stream network was broken into segments based on changes in gradient and valley confinement, following the classification of Montgomery and Buffington (1993). Channel classification is useful in identifying reaches of streams that are most sensitive to changes in water flow, sediment and wood input (or removal). It is also useful for identifying those reaches that have the potential to provide the best fish habitat.

Stream Channel Response Types

The distribution of stream types throughout the watershed is a description of how the stream network functions and how it is expected to respond to proposed projects. Different streams within the same stream type will respond similarly to changes in inputs of sediment, water, or wood. Certain stream types are more sensitive to physical changes than others. The sensitivity to disturbance for each stream type has been described by Montgomery and Buffington (1993).

In general terms, the routing of stream flow and sediment can be described by dividing the stream network into "source," "transport" and "response" reaches. Source reaches have gradients that are greater than 20%, and are found primarily in headwalls and along steep side slopes. These reaches are the primary source for much of the streams' flow and for inputs of organic material, nutrients and sediment. They have no floodplain development, and typically the riparian area is dominated by conifer.

The sensitivity of source reaches to disturbance varies widely with local surface geology and soil types (see Table 4.2). These reaches are subject to periodic scour by debris torrents (see Soils section of this report). Periodic, catastrophic disturbances in these reaches are typically a normal part of the watershed ecology in the coast range and critical processes in the maintenance of the aquatic ecosystem (see Benda, 1990). Many source reaches are intermittent or ephemeral channels (they have surface flow primarily in response to storm events).

There are approximately 333 miles (70% of total stream mileage) of source reach stream channels in the NF Alsea watershed; 182 miles (55%) are on BLM lands. The current functional condition of source reaches on BLM lands is largely unknown.

Table 4.2. Stream Types and Sensitivity To Disturbance

Stream Type	Sediment Supply	Riparian Vegetation	Peak Flows
Source	Low-High	Low-High	Low-High
Transport	Low	Moderate	Low
Response	Extremely High	Extremely High	Extremely High

Transport reaches have a relatively high gradient (4-20%), are fairly resistant to changes in stream morphology, and tend to act as conduits for material from high gradient reaches to depositional, response reaches. These reaches typically have a step-pool morphology, a large cobble or boulder substrate, and resistant banks with little or no flood plain development. Riparian vegetation is variable but tends to be dominated by conifer. There are approximately 81 miles (17% of total stream mileage) of transport reach stream channels in the North Fork Alsea**;** 35 miles (43%) are on BLM lands. The current functional condition of these reaches on BLM lands is largely unknown.

Response reaches have low gradients (less than 4%) and are areas of sediment deposition, stream meander, and high diversity and abundance of aquatic habitat (see Biological Processes in this report). These reaches can experience significant changes in stream morphology if sediment supplies increase, riparian soils and vegetation are disturbed, flow regime is altered, or channel elements (substrate, large woody debris, meander geometry, width-to-depth ratio, etc.) are disturbed.

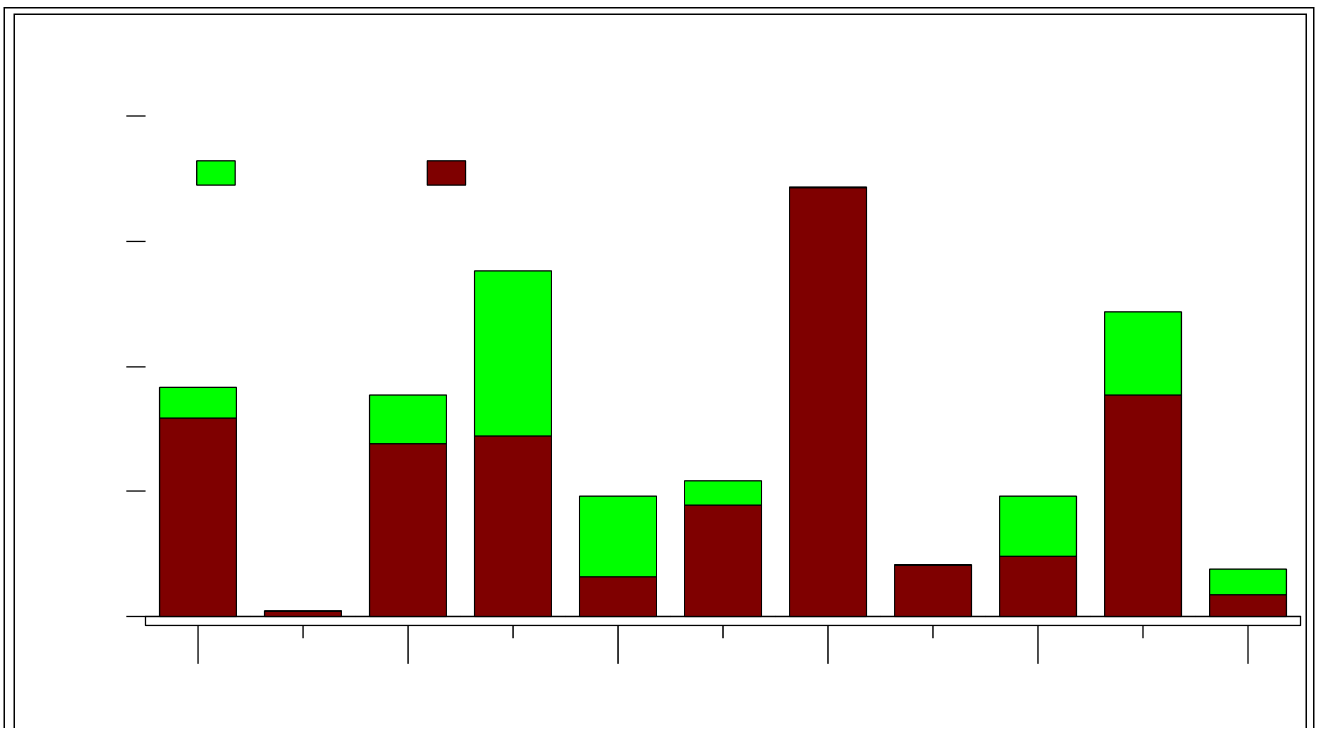
Identifying response reaches that are sensitive to disturbance is important because these reaches may be the most critical for anadromous fish habitat. In addition, the high water tables, large inputs of nutrient rich organic material, and the protected valley settings of these reaches combine to produce diverse and productive riparian habitat on the flood plain (see Riparian Vegetation in this report). Finally, these reaches are critical for the buffering of stream flows (they reduce floods and support summer base flow) and the maintenance of water quality.

In general, reaches that are sensitive to changes are low-gradient, unconfined channels, in uncohesive alluvium (gravelly, sandy or sandy-loam soils) especially at confluences with transport reaches.

Channel meander and flood plain development are the stream’s natural response to these conditions, and therefore, it is critical for the functioning of response reaches that proper channel geometry be maintained. The same elements that maintain stable channel geometry (substrate, large woody debris, meander geometry, width-to-depth ratio, etc), are also critical for the maintenance of biological processes.

There are approximately 64 miles (13% of total stream mileage) of response reach stream channels in the North Fork Alsea**:** 16.6 miles (26%) are on BLM lands (see Figure 4.7). The majority of response reaches

(41 miles, 63% of the total) are along the mainstem of the North Fork Alsea in Ryder, Lower North Fork, Honey Grove, Seely, and Crooked Frontal sub-watersheds. The majority of these reaches (33 miles, 81%) are on private lands, and most are used for agricultural production or pasture, and have been disturbed in conjunction with agricultural management (see Aerial Photo review in this report). It is critical for the maintenance of the aquatic ecosystem in the N. F. Alsea that these reaches be functioning properly, but most are not. This has likely shifted aquatic populations to habitat on adjacent reaches where conditions are better, if less than ideal. Some of these reaches are on BLM land (see Appendix 4, map 8 which displays a map of reach types in the N.F. Alsea).
The functional condition of the critical remaining response reaches on BLM lands is largely unknown. Inventory of response reaches on the North Fork Alsea is taking place at this writing and will be available for incorporation into the watershed analysis in a later iteration. It is probable that these reaches currently serve as refugia for aquatic species, such as anadromous fish, that find conditions in the mainstem of the North Fork Alsea to be sub-optimal.



Aerial Photo Review: Channels and Riparian Zones

Aerial photos from 1950 and 1993 were reviewed to identify historical changes in the channel and riparian zone. Identifiable from the photographs were changes to channel widths, bar positions, large woody debris, channel patterns, and canopy openings. The important channel forming processes in each sub-watershed were interpreted from the photo observations.

There is some uncertainty in the interpretations of processes and site-specific conditions because very little field verification was conducted. Aerial photo analysis can detect only large changes in stream channel conditions. Changes in streambed material, pool spacing or depth, and the width of streams under segments with a closed canopy cannot be detected with aerial photos. In addition, photo coverage immediately following the 1960s storm events, a critical period for channel and riparian condition, was not reviewed.

North Fork Alsea Watershed

The 1950s aerial photographs reflect a diversity of natural and human disturbances in the watershed with variable consequences for stream channels. The lower reaches of the North Fork Alsea, Ryder Sub-watershed, Lower Crooked Creek and their tributaries had already been altered to accommodate roads, agriculture, irrigation, and the fish hatchery. Straightened channels, abandoned flood plains and remnant stands of hardwood-dominated and mixed hardwood/conifer are the legacy of human and natural disturbance (also see Riparian Vegetation section of this report).

Much of the Flat Mountain area and the eastern portion of the watershed had been previously railroad logged in the early 1900s and clear-cut logged in the 1940s and early 1950s. Hillslopes in this area were heavily roaded, and many streams were disturbed by tractor logging in the flat riparian areas and in channels themselves. Evidence of heavy sediment loads is visible in some clear-cut stream channels. Riparian vegetation had been cleared to the stream banks, exposing streamflow to solar radiation.

The steep headwaters of the Parker, Yew and Ryder sub-watersheds as well as Slide Creek and Alder Creek were roaded along ridges and conifer stands from the 1930s fire were salvage logged, often using methods that precipitated slope failures, compacted surfaces, and altered stream channels and riparian zones. As in the eastern portion of the watershed, stream channels and hillslopes appear to have been heavily disturbed.

Much of the western portion of the watershed, Easter Creek, Racks Creek and Upper North Fork Alsea remained unroaded and unlogged. Vegetation and channels reflected recent fire history.

A younger, even-aged stand of conifer with brushy openings predominated on the upper slopes and ridges. Older stands of conifer and mixed hardwoods prevailed in many drainages. Channels are obscured by vegetation and difficult to view.

By the 1993 photos, large storm events in the 1960s and 70s, stand development, and changes in forest management practices are visible. The low gradient agricultural reaches remain in much the same condition as in the 1950s with no visible trends. The eastern portion of the watershed has a dense stand of 40 to 60 year-old conifer over most of the hillslopes, much available for commercial thinning, while stream channels are obscured by thick stands of hardwood and brush. The landslide prone, steep headwall areas and the adjacent channels that were burned in the 1930s also have dense stands of second-growth conifer. Many of the stream channels in areas that were roaded or salvage logged show evidence of debris torrents and landsliding, most related to road failures in the heavy storm runoff events of the 1960s and 70s. Riparian vegetation along many of these channels is hardwood and brush dominated. The western portion of the watershed has a network of ridgeline roads and cable yarded clearcuts in small patches. Failures are restricted to areas of poor stability, and riparian areas are either open or converting to hardwood and brush-dominated stands.

Water Quality and Withdrawal Rights

State of Oregon water quality standards and rules to protect the designated beneficial uses of state waters are set forth in the Oregon Administrative Rules (Chapter 340, Division 41). Only stream temperature (at a single site) and flow have been sampled on a regular basis in the watershed. Some limited water quality data from other sources (Storet database) were located ; additional data from private sources, University of Oregon, DEQ, or other public agencies may be available but were not located for this analysis.

The 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution conducted by the DEQ listed the North Fork Alsea as "No Problem and/or No Data Available." No further investigation by the state of nonpoint pollution sources in the North Fork Alsea is known to have occurred.

The N. F. Alsea is not monitored by the DEQ for water quality parameters as a part of its Ambient Monitoring Network. The Alsea river is sampled at three locations on a regular basis. As a whole, the Alsea is not cited as "water quality limited" in the DEQ's 1994 305(b) report on water quality (ODEQ 1994). Beneficial uses (cold-water fisheries, recreation, domestic and municipal water) are reported to be "supported" although fecal coliform levels at river mile 20.9 were found to be high and can only "partially support" water contact recreation.

Despite limited data availability, existing temperature, water quality, and channel condition (see Aerial Photograph Review in previous section) assessments imply that water quality in the North Fork Alsea has probably deteriorated relative to reference conditions.

Grab sample data for turbidity, pH, conductance, dissolved oxygen (DO), temperature and base flow have been collected at several sites on the N. F. Alsea in 1958, 1972, and 1995. While useful as general indicators of water quality conditions at that moment in time, these data are not sufficient to characterize water quality trends or the maintenance of state water quality standards. Without additional data collected over a period of time, it is not possible to state (with the exception of stream temperature in the Lower N. F. Alsea) with certainty whether water quality standards in the N. F. Alsea (or portions of the watershed) have been maintained or are currently at acceptable levels.

Water Quality Parameters of Concern

Sediment and Turbidity

Sediment production, delivery to streams, and transport through streams is poorly quantified throughout the Coast Range, including the North Fork Alsea. Sediment processes are understood in a generic sense, but site specific data are rarely available. Initial attempts to characterize the sediment regime in the N. F. Alsea were begun in 1995 with the implementation of a turbidity sampling network, inventory of selected portions of stream channels, and a road inventory. Although additional sediment monitoring is recommended in this report (see Chapter 6), no additional measurements of sediment delivery or transport were located for this analysis.

The BLM collected turbidity data with grab samples at several sites in the Alsea River watershed during 1995. These data appear normal for coastal watersheds when compared to other river basins. Beschta (1981) found turbidities exceeding 30 NTUs on Flynn Creek and Oak Creek in his studies of turbidity/ sediment relationships. Beschta's 1979 study found turbidity that did not exceed 10 NTUs on Mill Creek during late winter runoff. The average turbidity in the Alsea basin was 3.06 NTUs, and the maximum turbidity found was 12 NTUs, which is similar to the Mill Creek study results.

The highest turbidities (NTU = 12) in the N. F. Alsea were measured on Honey Grove Creek. A casual review of sections of lower Honey Grove Creek indicate that bank erosion in lower gradient reaches on private lands is the probable source. Bank erosion and high turbidity levels are a common result of channel disturbance in "response" reaches such as lower Honey Grove Creek and the mainstem of the North Fork Alsea.

Although these data imply some point sources of high sediment inputs to the N. F. Alsea watershed (i.e., bank erosion in channels), they are not adequate for indicating that water quality standards have been exceeded or maintained or for characterizing the sediment regime in the basin. Many streams in the watershed were not monitored in 1995, and peak flow events in the fall (typically the highest sediment producing storms of the year) were not sampled. Additional in-stream monitoring (V*, bed load, channel cross-sections, etc.), will be necessary for a better understanding of the sediment regime in the Alsea River

Roads and Trails as Sediment Sources

Some potential sources of accelerated sediment delivery to streams were identified during the BLM's summer 1995 road inventory. Recommendations for treatment of these sources are listed under restoration opportunities. In addition, road segments on BLM lands were evaluated for risk to water quality as one factor under the transportation management objectives section of this report. Roads built on slopes that are at risk for landsliding are a high priority for closure. When kept open for access or due to right-of-way agreements, these sections of road need to be monitored on a regular basis during winter storm events and given highest priority for maintenance.

Approximately 50 miles of motorcycle trail exist in the North Fork Alsea. These trails are located primarily in the Upper Crooked Creek, Crooked Creek Frontal, and Seely Creek sub-watersheds.

The trail system makes use of an old network of roads and cat trails on both private and BLM land. About 10.5 miles of the trail system are on surfaces that were never intended as roads (i.e., old cat trails, yarding trails, etc.) with 35 miles on portions of the road system. The trail system has not been thoroughly inventoried, portions of the system are not currently being maintained by the BLM, with segments of the trails crossing streams and riparian reserves. This trail system may be a source of accelerated slope erosion and stream sedimentation to tributary streams of the N. F. Alsea river. A map displaying the trail system currently in use by motorcycle and other off-highway vehicles can be found in Appendix 4, Map 9.

Additional sediment sources (both in stream and from roads), especially on private lands, are likely within the watershed but remain unidentified for this analysis. Based on current data, it is not possible to state with any confidence whether or not accelerated stream sedimentation is degrading water quality in the N. F. Alsea watershed (or portions of the watershed) with impacts to beneficial uses such as cold water fisheries.

Microbiology

Concern over the potential for introduction of pathogenic micro-organisms has risen in recent years, due in part to the increased human use associated with unmanaged, dispersed camping and recreation occurring in riparian areas adjacent to North Fork Alsea as well as to livestock grazing in the river's lower valley reaches. The extent and effects of microbial contamination are unknown.

High levels of bacteria in forested areas will usually be associated with inadequate waste disposal by recreational users, presence of animals in the riparian zone, and septic systems (EPA 1991). Dispersed camping and recreation occurs along the stream banks throughout the watershed, and may result in unsanitary disposal of human fecal matter in the riparian zone. To some extent bacterial contamination of streams may result from elk and other wild animals. In addition, incidences of giardia, cryptosporidium, and *E. coli* contamination of surface and spring water in the area have been reported (O'Shea, 1995).

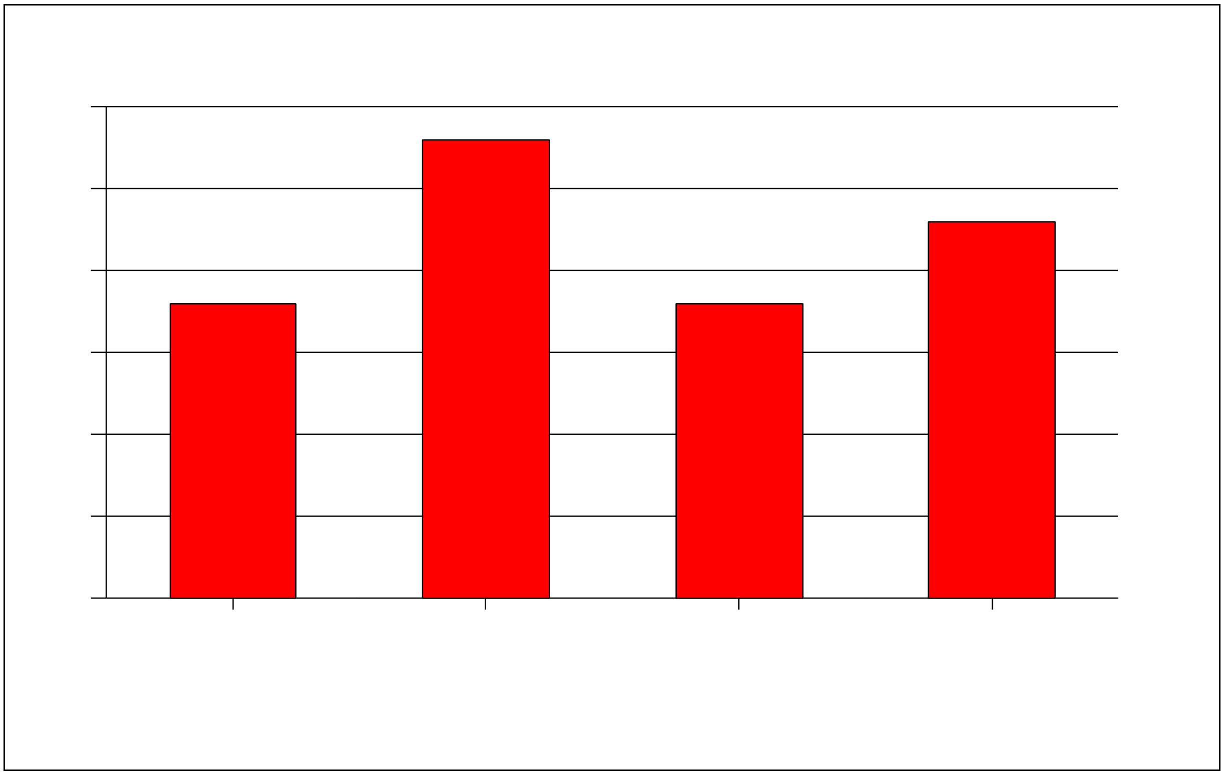
The existence or extent of water-borne disease contamination of N. F. Alsea surface waters appears to be unknown. Total coliform and fecal coliform counts exceeded drinking water standards on 7/31/72 when sampled near the town of Alsea. Follow up samples have not been taken, nor has the BLM sampled for giardia or other water-borne disease organisms. Nevertheless, giardia is considered an endemic species, and is commonly found in beaver and even domestic dogs throughout the state. All surface waters utilized for domestic purposes should be disinfected and filtered. Domestic water users may have their drinking water quality tested for a nominal fee by the Microbiology Department at Oregon State University in Corvallis.

Stream Temperatures

Direct solar radiation is a principal factor in raising stream temperatures which are also largely affected by the quality and quantity of shade-producing vegetation. Natural disturbance agents such as fire, windthrow, and storm-induced channel scour, and human activities such as timber harvest, road construction, and riparian-based recreation have the potential to influence stream temperature by altering streamside vegetation and channel form.

Figure 4.8, displays temperatures for the main stem of the North Fork Alsea (1977-1994, Fish Hatchery) compared to the Alsea, Nestucca, and an estimated historic range (FEMAT 1993). The N.F. Alsea data (collected at the NF Alsea fish hatchery), imply that the lower portion of the N. F. Alsea is outside of its expected historic range and maximum, but below maximum temperatures found in the Alsea watershed as a whole. Unfortunately, these stream temperature data probably do not reflect actual temperature conditions experienced by fish in the Lower N. F. Alsea channel.

Temperature is measured at the diversion outlet after being pooled at the diversion dam and piped



underground to the hatchery. Some of the lower stream temperature extremes from these data are below freezing, suggesting that the temperature probe may have been exposed to air rather than immersed in the stream flow.

Despite weaknesses, these data clearly imply that stream temperatures in the N. F. Alsea channel below the hatchery (after it has been stored and pooled in the hatchery rearing ponds) are likely to be above the threshold of 14.4 ^{o}C for periods of time during summer base flow.

Figure 4.9, displays average maximum stream temperatures ("average maximums" = the average of all temperatures equal to or greater than 14.4 ^{o}C) at the Alsea Hatchery. Critical high stream temperature periods occur mainly from June 1 through September 30. Stream temperatures during this critical heating period have consistently exceeded the state water quality standard of 14.4 ^{o}C during low summer flow conditions. Temperatures have reached a range that is potentially deleterious to fish every year since data collection began (1977).   Grab sample temperature readings taken in 1958 at three sites along the N. F. Alsea imply that temperatures above the critical limit for salmonids were already occurring at this time. Channel and riparian conditions at this time were probably promoting stream temperatures above optimum, especially during base flow periods from July to October.

No discernable trend in stream temperature maximums is evident in these data, suggesting that a reduction of the stream temperatures to a range that is acceptable for salmonids will not be reached in the lower reaches of the N. F. Alsea without intervention to improve channel habitat conditions. Stream temperature data for other sub-watersheds and reaches in the N. F. Alsea watershed were not available for this analysis.

Other Water Quality Parameters

The following is a brief discussion on additional water quality parameters measured in the N. F. Alsea. A brief discussion of these values follows.

Aquatic Invertebrates **-** Sampling of N. F. Alsea for populations of aquatic macro-invertebrates occurred on July 27, 1995, using EPA Rapid Assessment Protocols. Preliminary results from this sampling were not available for this analysis.

pH - All samples were within the range (5.0- 9.0) set by the EPA as necessary to protect aquatic life (EPA 1991).

Conductance - No standards have been established. Sample values are at the low end of natural variability. This is expected in streams of the Pacific Northwest.

Dissolved Oxygen - In western Oregon basins with salmonids, " freshwaters shall not be less than 90% of saturation at seasonal low, or less than 95% of saturation in spawning areas during spawning." None of the grab samples were below this standard although DO saturation on the N. F. Alsea below the bridge on Highway 201 approached 90%. This reach should be monitored regularly. High nutrient loads in water exiting the N. F. Alsea fish hatchery could potentially affect stream DO during summer base flow, but data, if available, were not located for this analysis.

Nutrients - Nutrients were sampled in 1958 and 1972. Values appear to be in the ranges expected of

NORTH FORK ALSEA WATERRIGHTS

CREEK SOURCE	CFS	USE % IR	FI	MU	LV	DI	DO	ID
N.F. ALSEA	56.548	15.642	83.115	1.238	0.005	0.000	0.000	0.000
KIGER CREEK	0.080	0.000	0.000	100.000	0.000	0.000	0.000	0.000
HONEY GROVE CR	0.690	95.652	0.000	0.000	1.449	2.899	0.000	0.000
LITTLE ALDER CR	0.030	0.000	0.000	0.000	0.000	0.000	100.000	0.000
SPENCER CREEK	0.080	62.500	0.000	0.000	0.000	25.000	12.500	0.000
CROOKED CREEK	0.325	95.385	0.000	0.000	0.000	1.538	3.077	0.000
BAILEY CREEK	0.620	0.000	0.000	0.000	0.000	0.000	0.000	100.000
BAKER CREEK	0.300	100.000	0.000	0.000	0.000	0.000	0.000	0.000
SEELEY CREEK	0.000	0.000	0.000	0.000	0.000	0.000	100.000	0.000
RYDER CREEK	0.090	0.000	0.000	0.000	0.000	0.000	0.000	100.000
HAYDEN CREEK	0.053	94.340	0.000	0.000	5.660	0.000	0.000	0.000
TOTAL =	58.816							

freshwater streams. It is anticipated that nutrient levels, particularly organic nitrogen, may be high immediately below the N. F. hatchery but this has not been monitored.

Herbicides and Pesticides - Sampling data for organic chemicals have not been located for this analysis.

Water Withdrawal Rights

Table 4.3, displays the water withdrawal rights, by stream, for the N. F. Alsea (Oregon Dept. of Water Resources). The largest withdrawal right, 56.5 cubic feet/second (cfs), is owned by ODFW to provide for the Alsea Hatchery.

During summer baseflow, streamflow is occasionally below ODFW's withdrawal rights, and most of the flow from the N. F. Alsea is diverted at the dam site above the hatchery and returned to the stream channel below (pers. comm., ODFW personnel 1995). Withdrawal rights on other streams in the basin total less than 3 cfs, and are primarily for irrigation or domestic use.

Use %: IR= irrigation, FI= fisheries, MU= municipal, LV= livestock, DI=, DO= domestic, ID=Industrial

Confidence in Analysis of Physical Processes

Streamflow

There is high confidence in the North Fork Alsea streamflow data from the USGS. Hypothetical alterations in stream flow from "reference conditions" are based on professional estimates, deductions, and extrapolations from regional research. Overall, the material in this section is adequate for broad planning purposes, but site-specific data and recommendations are necessary to apply conclusions from this section.

Channel Condition

Since this analysis was mostly office-based with few field visits, determination of stream types could only be completed qualitatively to a broad level classification. The categories cited in this analysis are general representations of the reaches described, and may include shorter sections with different response potential. Channel gradient and entrenchment were determined using topographic maps followed by selected field visits, and channel response types were then determined from gradient classes. Streambed and bank materials were estimated using soil survey and geologic maps or based on qualitative field estimates.

Aerial photos were used to determine sinuosity and channel condition when channels were visible. When possible, field verification was conducted. Existing stream surveys were used and extrapolated to similar channels in other parts of the watershed when appropriate. Overall, the material in this section is adequate for broad planning purposes. Site specific data and recommendations are necessary to apply conclusions from this section.

Water Quality

Water quality data, as stated, is extremely limited for the North Fork Alsea River watershed. Conclusions are mostly hypothetical, and are based on professional estimates, deductions, and extrapolations from research. Overall, the material in this section is adequate for broad planning purposes, but site-specific data and recommendations are necessary to apply conclusions from this section.

Biological Processes

Riparian Vegetation

Riparian vegetation performs several important functions in aquatic ecosystems. It provides a primary source of energy and nutrients for small streams. It maintains channel and flood plain stability during floods and channel shifts by holding onto sediment with its roots system, and trapping floating wood with branches and stems. Riparian vegetation also supplies the source of large wood that maintains an active flood plain, forms a variety of surfaces for riparian vegetation to develop, and creates high quality fish habitat. Finally, riparian vegetation shades streams and wetlands to keep water temperatures suitable for a wide variety of aquatic species.

Riparian vegetation contains some of the most complex vegetative patterns on the landscape. Fire, debris torrents, flooding, and blowdown all interact with flood plain and toeslope surfaces to develop a complex mosaic of vegetation containing all potential seral stages (for a discussion of riparian areas as special habitat, see Wildlife and Vegetation sections in this report). The processes which operate to form riparian vegetation patterns differ between small and large channels.

Following an intense fire, many small streams are scoured to bedrock by debris torrents. Along the stream banks a vegetative successional pathway begins, with the colonization of alder and salmonberry. Conifer then become established upslope of the stream banks, and over time they begin to shade out the alder due to their height and the narrow valley bottoms. Upslope conifers periodically fall into the channel, providing nurse logs and openings for other conifers to become established nearer the channel. In this way, conifers slowly encroach on these streambamks. Debris torrent tracks in late-successional forests are colonized by conifers much faster than slopes where fire alone has removed the upslope vegetation.

In larger streams, flooding and blowdown, in addition to fire, are the dominant disturbance mechanisms. Following fire, debris torrents and burned riparian areas deliver large amounts of wood and sediment to these streams and adjacent banks. Large volumes of sediment are stored upstream of debris torrent deposits and wood accumulations. Eventually, as wood breaks and floats downstream, streams cut through these deposits and leave terraces upstream of the old deposits. Terraces are continually being formed and cut in stream systems with abundant wood.

The height of terraces, extent of soil development, and the availability of nurse logs strongly influence the riparian vegetation patterns found on the flood plains of larger streams. On low terraces, red alder is the dominant tree species, while on higher terraces and nurse logs, western hemlock and western red cedar are dominant, with bigleaf maple being more common in the upper half of the main stream channels. Douglas fir may dominate on drier sites. The oldest and largest trees (typically conifers) are found on the highest terraces. Younger trees grow on the lower terraces closer to the stream channel. Salmonberry with alder and maple dominated canopies are common in the upper reaches of mainstems due to frequent disturbance by floods in the narrow valley floors and the higher amount of beaver activity.

Western hemlock, and western red cedar are the dominant coniferous species on floodplains due to their adaptations to flood plain conditions. Red Cedar can tolerate high water tables because they develop adventitious roots when covered by water and sediment. Both species are shade-tolerant.

Mature riparian vegetation usually creates complex channel morphology with abundant large wood because the vegetation provides a source of large wood for the stream channel. Although floods may transport wood downstream, adjacent vegetation is continually replacing it through bank-cutting and blowdown.

Riparian Vegetation in the North Fork Alsea

The broad vegetative patterns in riparian zones are:

> Higher elevation, steeper drainages have predominately conifer in stream adjacent stands (I. e., Peak Creek, Easter, and Racks with 53, 54 and 59% conifer, respectively);
>
> Racks Creek and Upper North Fork Alsea are the subwatersheds with the most recent timber harvest activity. As a result, both basins have close to 20% open riparian canopies, 24-34% hardwood dominant, with the unharvested streams predominately 80 year+ conifer.
>
> The watersheds with large, flat alluvial bottoms are, as expected, dominated by hardwood riparian zones: Honeygrove Creek, Upper Crooked Creek, Ryder Creek, and Crooked Frontal with 50, 55, 50, and 54% hardwood dominate riparian zones, respectively.
>
> Uncharacteristically, the steep channeled Seely Creek and Yew Creek have high proportions of hardwood dominated riparian stands suggesting heavy disturbance in these watersheds.

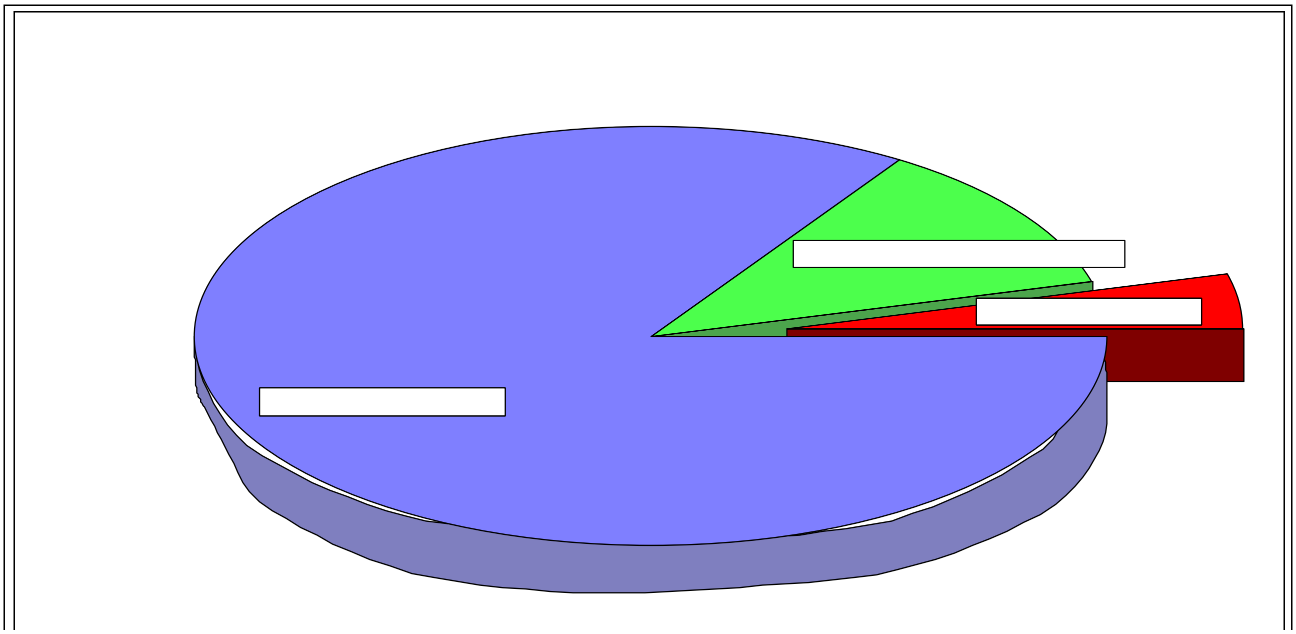
Riparian Shade Condition by Subwatershed

Since stream temperature data at most locations in the North Fork Alsea were not located for this analysis, a risk analysis was conducted to evaluate the potential for increases in stream temperatures, based on an assessment of canopy closure in the adjacent riparian zone from satellite imagery.
Perennial stream segments with riparian vegetation class "OPEN" (within a 10 meter buffer) were rated as "High Risk" for having increases in stream temperature at baseflow due to exposure to solar radiation and lack of insulating cover. Those segments that were classed as "Semi-Open" were rated as "Moderate

Risk." Intermittent streams are assumed to have no flow during the critical periods for high stream temperature and therefore were not evaluated.

The length of stream in each category is displayed in Figure 4.10. A map of high risk channel segments is displayed on (see Appendix 4, Map 10).

In streams with poor shade levels there is risk of an altered temperature regime and increases in stream temperatures into a range that is potentially detrimental to anadromous fish reproduction and survival (generally, temperatures above 58 degree F) . (see Water Quality and Fisheries sections in this report). There are 8.7 miles (4% of total) of high risk stream, 24.3 miles (12% of total) of moderate and 175 miles (84% of total) of low. Most of the moderate - high risk stream sections are in the lower North Fork Alsea in the Ryder subbasin. These areas are candidates for stream temperature monitoring during summer base flows.

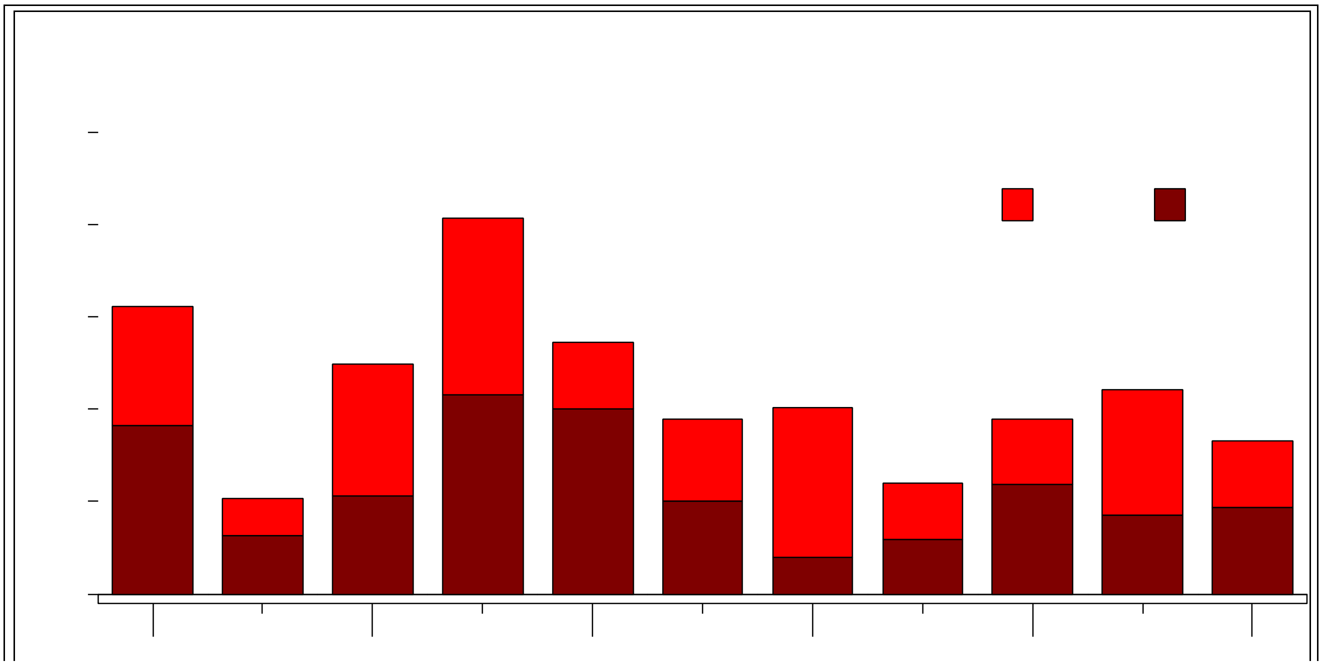


Large Woody Debris Recruitment from the Riparian Zone

Potential for recruitment of large woody debris (LWD) to stream channels and floodplains was estimated using vegetation seral stage data based on satellite imagery interpretation, Figure 4.11. High recruitment potential was assumed for riparian stands within 100 feet of the stream channel dominated predominately by conifer of any age class or by mixed conifer-hardwood stands. Riparian zones that are open, semi-open, brush or agricultural fields or hardwood dominated are assumed to have low LWD potential. A map displaying recruitment potential by stream segment and ownership is displayed in (see Appendix 4, Map 11).

There are 223 stream miles (48% of total) that have low LWD recruitment potential. As a proportion of each subbasin, percent of stream miles with low LWD potential ranged from 27% on Parker to 80% on Ryder. Over 50% of the streams on Honeygrove, Seely, Upper North Fork Alsea, and Ryder all have low LWD recruitment potential.

BLM managed lands have 83 stream miles that have low LWD recruitment potential (36% of the total of low potential stream mileage). These riparian areas on BLM lands are fairly evenly distributed through the North Fork Alsea subbasins with the exception of Ryder, where the BLM has little ownership. These riparian areas are candidates for management activities to improve recruitment potential.



Wetlands and Ponds

Known wetlands on BLM lands in the North Fork Alsea are mapped in (see Appendix 4, Map 12). This map was generated from the BLMs TPCC data base. Detailed identification and inventory of wetlands in the North Fork Alsea is proceeding on a site by site basis during regular field investigations. Current condition of wetlands on BLM lands is largely unknown. For wetland contributions to special habitat, see the Wildlife and Vegetation sections of this report.

Confidence in Analysis of Riparian Conditions

Stream Temperature Risk

Confidence in the assessment of canopy closure is high due to good satellite coverage and interpretation techniques. Actual affects on stream temperatures will vary due to unmeasured factors such as groundwater contribution, channel conditions, and topographic shading.

Conclusions concerning risk of alterations in stream temperature from "reference condition" are hypothetical and are based on professional estimate, deduction, and extrapolation. Overall, the material in this section is adequate for broad planning purposes. Site specific data and recommendations are necessary to apply conclusions from this section to actual streamside or in-channel projects.

LWD Recruitment Potential

Confidence in the assessment of riparian vegetation (species and d.b.h.) is high due to good satellite coverage and interpretation techniques. "Potential" is a qualitative term based on the assumption that trees within 100 feet of the stream channel are the most likely to actually reach the channel after falling. This assessment does not integrate current channel and habitat conditions or evaluate the need for LWD on a site specific basis.

Conclusions concerning LWD recruitment potential are hypothetical and based on professional estimate, deduction, and extrapolation. Overall, the material in this section is adequate for broad planning purposes. Site specific data and recommendations are necessary to apply conclusions from this section to actual streamside or in-channel projects.

Fisheries

The North Fork Alsea River Watershed supports a variety of anadromous salmonids, including winter steelhead trout (*Oncorhynchus mykiss*) , chinook salmon (*O. tshawytscha*), and coho salmon (*O. kisotch*). Freshwater fish species occurring in the N. F. Alsea watershed include lamprey (*Lampeta tridentata*), dace (*Rhinichthys osculos*) , sculpins (*Cottus aleuticus*) and cutthroat trout (*O. clarki*). There are 88.4 miles of
anadromous fish streams and 207 miles of resident cutthroat trout streams. Parker Creek, Upper N. F. Alsea, Racks Creek, Easter Creek and approximately 50% of the rest of the N . F. Alsea watershed are blocked to anadromous salmonids by major waterfalls. Although there are many miles of stream unaccessible to anadromous salmonids, these streams still provide fair to good resident cutthroat trout habitat.

Background

Habitat alteration and other human activities, combined with natural episodic events, have caused some wild populations of Pacific anadromous salmonids to decline precipitously from historic levels (Nehlsen et al. 1991) Hatchery programs have helped maintain the fisheries for some species, but concern over the effects of hatchery introductions on the health and genetic viability of wild stocks has shifted emphasis to expanding programs that restore natural habitats and benefit wild production (Chilcote et al. 1986)

The importance of large woody debris (LWD) in creating fish habitat in streams has been recognized since the early 1980s (Bisson et al. 1987, Sedell et al. 1988). The primary sources of LWD inputs into streams are from trees within the riparian areas and from debris torrents and landslides from upland sites. Prior to the 1970s, few buffer strips were left along stream channels during timber harvest. Most of the large conifers adjacent to streams were removed; merchantable trees, especially cedars, were often removed from stream channels as well. These practices substantially altered riparian vegetation, and reduced or eliminated both the number of trees available to fall into the streams and the amount of stable large woody debris within the streams.

Early logging practices deposited large quantities of cull logs and slash into stream channels. This material often consolidated into log jams large enough and tight enough to become potential barriers to fish migrations.

Road construction (primarily private) continues throughout the N. F. Alsea watershed. In addition to continued sediment input and altering the drainage network, the presence of roads immediately adjacent to stream channels continues to reduce the amount of riparian vegetation and the number of large conifers available to fall into the streams.

Numerous debris removal projects, usually associated with timber sales, were implemented by state and federal agencies in the late 1960s through the early 1980s with the intent to remove harmful accumulations of logging debris and improve fish passage.

Due to the amount of slash in the streams, much of this work was needed. However, in many areas, these projects over-cleaned the stream channel and removed all of the wood, including all naturally occurring pieces. Removing the existing large, stable pieces of wood from the streams proved detrimental, simplifying the systems by removing the obstructions which trapped gravels, created pools, and provided cover for fish.

Early habitat conditions of the N. F. Alsea watershed are summarized from " Stream Surveys on the Alsea River System" (Oakley 1963). These surveys were conducted by the Research Division of the Oregon Fish Commission from 1947 through 1957, and showed that production from this Oregon coastal river contributed valuable anadromous salmonids to ocean troll and various sport fisheries. Species produced included chinook salmon, coho salmon, chum salmon, steelhead trout, and cutthroat trout. (Oakley 1963)

During the 1970s and 1980s, stream inventory data were collected by the Salem BLM, and later analyzed in a habitat analysis report (House 1987). These stream surveys were conducted above the North Fork Alsea Dam, and highlighted the following limiting factors: rearing habitat, spawning habitat, fish passage and instream structure. The evaluation recommended the following projects: logjam passage, riparian revegetation, instream structure, falls passage, pool construction and dam passage.

The native fisheries of the N. F. Alsea River has been influenced by two hatcheries in the Alsea River system: the Fall Creek Hatchery which releases salmon, and the Alsea Hatchery which releases steelhead and trout. These fish hatcheries have been in operation since 1934 by the Oregon Department of Fish and Wildlife (ODFW). The Alsea Hatchery is located within the N. F. Alsea watershed.

There was a fish ladder in operation at the Alsea Hatchery until it was destroyed in the 1964 flood. The dam associated with the fish ladder remains as a barrier to upstream anadromous fish movement. A few steelhead have passed the dam in some years during high flows, and are the only anadromous fish present above the hatchery dam (House 1987). In addition to the dam, several waterfalls prevent anadromous fish passage: three on the main stem of the N. F. Alsea River; three on Slick Creek; three on Parker Creek; two on Racks Creek; and one each on Ernest Creek and Easter Creek.

The decline of wild fisheries has become a concern throughout the this river basin and the west coast. Numerous native anadromous salmon and trout stocks in the Pacific Northwest are considered to be threatened and declining, and may be at risk of extinction. Coastal steelhead and coho salmon, including those found in the N. F. Alsea River drainage, were petitioned (in 1994) for federal listing under the Endangered Species Act. The coastal coho and steelhead have been identified as "stocks at risk" (Nehlsen et al. 1991), and recently the coho salmon has been proposed by the National Marine Fisheries Service for listing as " threatened" under the Endangered Species Act.

It is widely recognized that propagation of anadromous fisheries is a major beneficial use of water resources in the Pacific Northwest. Life stages of anadromous fish affected by water quality include: spawning, summer rearing, out-migration, survival of eggs/alevins, overwintering, and returning spawners. Seasonal migrations result in year-round usage of the watershed by adult anadromous salmonids. The distributions of salmon (coho and chinook) and steelhead and cutthroat trout are displayed in Maps 13 and 14, respectively in Appendix 4.

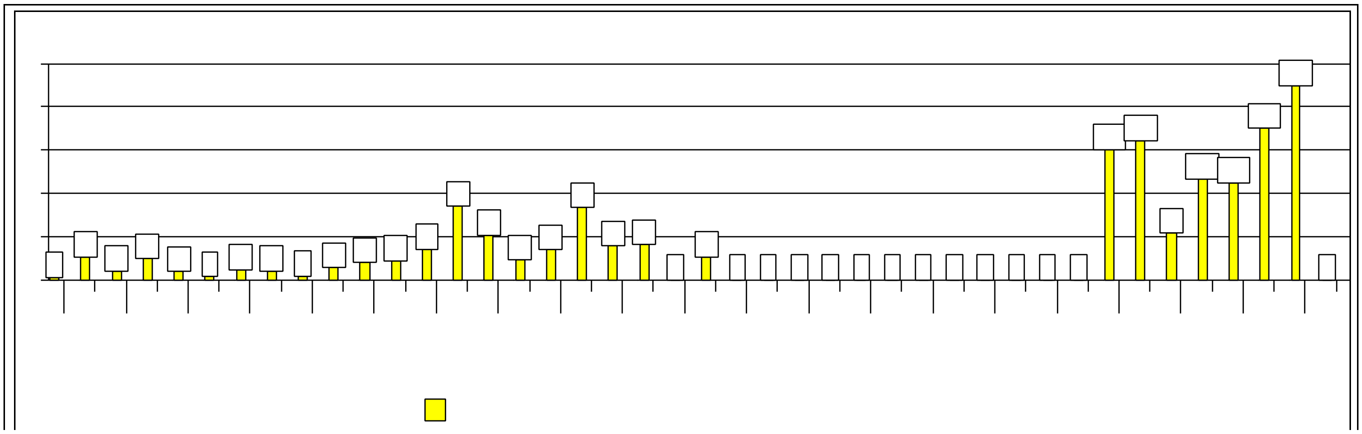
A number of factors affect the regional decline of salmonids: farming; the use of pesticides and fertilizers; poor ocean conditions; log jam removal (stream cleaning); logging of streamside vegetation; landslides; fish hatcheries; major flood events; splash and power dams; harvesting; and predation by marine mammals.

Habitat for anadromous and resident fish species and other aquatic species is degraded and/or declining in many areas of the Pacific Northwest as a result of the factors listed above. Typical habitat problems include excessive stream sedimentation, lack of large woody debris, lack of quality pools and spawning gravels, reduced stream flows, and elevated water temperatures. Similar to the regional situation, reductions in habitat conditions have also occurred in the N. F. Alsea watershed.

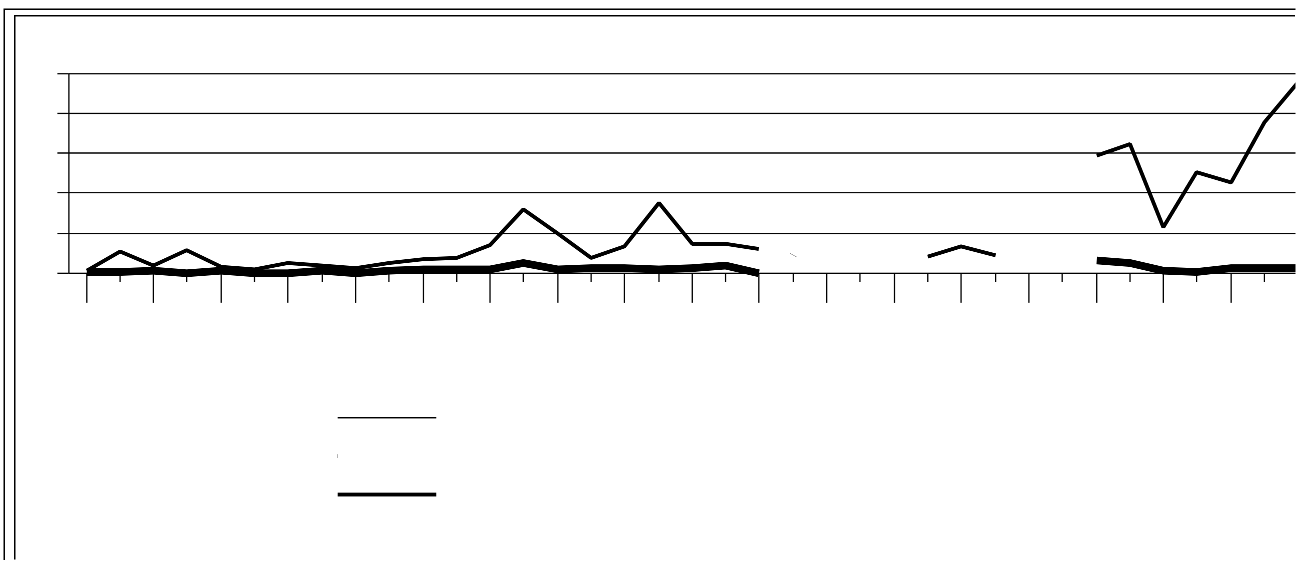
Fish Distribution

Fall Chinook Salmon

Fall chinook in the North Fork Alsea spawn primarily in the mainstem below the Highway 34 bridge. Adult fall chinook salmon generally appear in the N. F. Alsea River around the first part of October (depending on river conditions) and run through November. Adult fall chinook salmon utilize approximately 10.3 miles of stream within the watershed, mostly in the mainstem of the N. F. Alsea River and its major tributaries, of which the BLM manages approximately 1.4 miles. Habitat requirements include large beds of spawning gravels in mainstem and major tributaries, and large, deep pools for resting and juvenile rearing. Most juvenile chinook leave the stream and rear in estuaries. They typically enter the ocean during late summer of their first year of life.



The ODFW has conducted a spawning survey for fall chinook in the North Fork Alsea for most years since 1952, utilizing punch cards, ground and weir trap methods. This survey shows a favorable trend from 1985 - 1992, (see Figure 4.12). Fall chinook escapement numbers are illustrated in Figure 4.13, these escapement numbers correlate to the favorable spawning numbers in Figure 4.12. Current ODFW management direction for fall chinook management in the Alsea basin is to maintain and enhance this trend. (For more information on escapement data, see Oregon Salmon and Steelhead Catch Data Reports No.94-2 and Oregon Coastal Salmon Spawning Surveys, 1992, Information Report No. 94-2.)

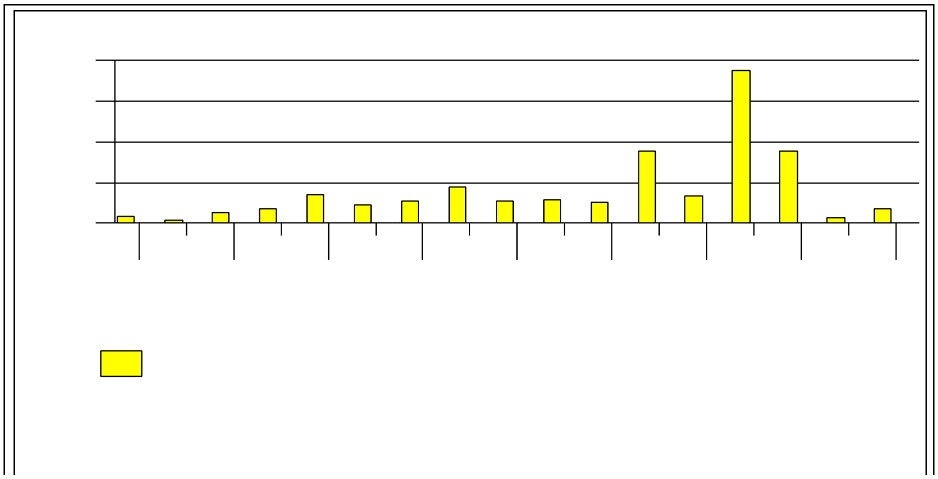


Spring Chinook

Surveys conducted by ODFW indicate a small wild spring chinook run in the Alsea basin . Spawning appears to take place in Drift Creek (west from the confluence of the North and South Forks of the Alsea River), and in the N. F. Alsea River, below the Hwy. 34 bridge, with rearing taking place in the estuaries.

Since the 1950s, spawning surveys by ODFW on spring chinook in the N. F. Alsea River and Drift Creek indicate a decline in the Drift Creek run and a more stable spawning escapement for the N. F. Alsea River run. In recent years, the spring chinook spawning population is thought to have been inflated by stray Rogue River hatchery stock from a private hatchery located in Newport, Oregon. Spring chinook releases from this hatchery have been discontinued, with the last adult returns occurring in 1993. The Oregon

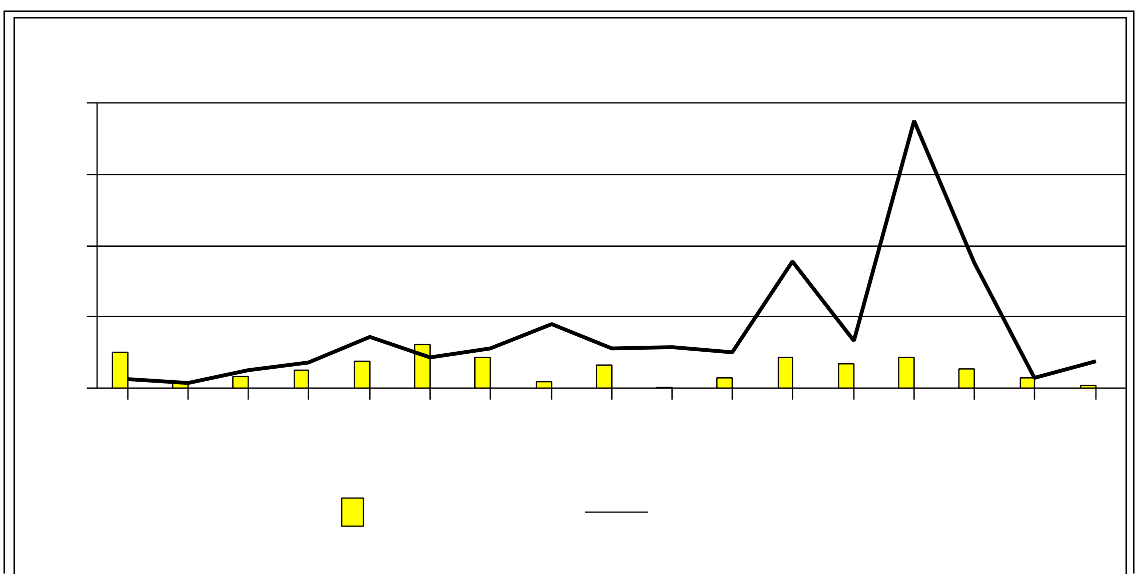
Coastal Salmon and Steelhead Catch Data Report shows that from 1977-1993 spring chinook escapement numbers were under 200, the peak count being 187 in 1990, Figure 4.14.



Angler harvest of spring chinook has been less than 100 fish in recent years, except for a peak in 1990 of about 200 fish Figure 4.15. The small harvest reinforces ODFW's escapement surveys which indicate a depressed run size. Long-term sustain ability is a concern due to the small run size, competition with expanding fall chinook populations, high summer water temperatures and marginal habitat in general (Bob House, pers. comm.).

ODFW management direction for Alsea spring chinook is to take actions to assure continued viability of this run. Actions that have been implemented include a closure of the Alsea Basin upstream from the Five Rivers confluence to all chinook harvest from May through the end of October. This regulation change was implemented in 1992, with additional regulation changes possible to further reduce the spring chinook harvest.

A second action includes additional surveys and inventories of population size, spawning distribution and adult holding areas. The focus of these surveys will be from the Hwy. 34 bridge downstream to the Five Rivers confluence. This will provide an improved basis for recommending necessary habitat protection measures.



Additionally, spring chinook may benefit from increased habitat for spawning and adult holding with the re-establishment of upstream access for anadromous fish above the hatchery on the N. F. Alsea River.

Habitat condition in the North Fork Alsea is critical to maintaining the overall Alsea Basin wild spring chinook population. The North Fork has the only consistently documented spawning spring chinook. In addition, the ODFW believes a large proportion of the remaining spring chinook utilize the mainstem Alsea from the confluence of the North and South Forks downstream to about Fall Creek. This area is directly influenced by flow and sediment delivered from the North Fork.

Coho salmon

Adult coho salmon usually appear in two runs. The first run, which starts in October and ends in late November, is mostly of hatchery origin; the second run, starting in early December and ending in early February, is mostly wild stock. Coho salmon inhabit approximately 47 miles of stream within the Alsea River Basin and 27.3 miles in the N. F. watershed, and all major streams have some habitat available. The distribution of coho is limited by falls in five subwatersheds: Lower N. F., Easter Creek, Parker Creek, Racks Creek, and Upper N. F. Alsea River. Spawning requirements of this species are clean spawning gravels in low to medium gradient mainstems and tributaries; rearing habitat is primarily in dammed pools and backwaters; and coho depend on good instream structure and cover. The coastal coho salmon has been proposed for federal listing as a threatened species under the Endangered Species Act (ESA).

Coho salmon are present in the North Fork Alsea in tributaries below the fish hatchery. The ODFW identifies 17.6 miles of coho habitat in tributaries of the North Fork Alsea, but this excludes the mainstem North Fork Alsea, although it is used by juvenile and adult coho for passage. The coho habitat within the North Fork Alsea watershed represents an estimated 8% of the overall Alsea Basin stream miles used by coho for spawning and extended juvenile rearing.

In addition to this potential coho habitat, ODFW plans to re-establish anadromous fish access into the North Fork Alsea above the fish hatchery. Coho salmon will probably be allowed to naturally re-colonize into this area.

The current status of coho salmon in the Alsea Basin, including the North Fork, is severely depressed. This assessment is based primarily on a comparison of population size estimates from randomized spawning area surveys from 1990-94 to historic abundance estimates based on commercial net fisheries in the ocean, and a 1951 mark-recapture population estimate (63,000 in the Alsea Basin; Buckman, pers. comm.).

The North Fork Alsea is assumed to have depressed coho return similar to the rest of the Alsea. Spawning surveys were conducted during 1990-1994 on two tributaries in the North Fork below the hatchery. A survey on Honey Grove Creek identified one coho carcass, while no live or dead coho were observed in a Crooked Creek survey. Also, in Zahn Creek, a tributary of Crooked Creek, a long time resident observed a major decline in the presence of coho and steelhead, from “many” to zero within the last 25 years (Robert Vincent, pers. comm).

Escapement data were collected from the mouth of the N. F. Alsea to Kiger Creek from 1976 - 1993, and from the mouth of the Slide Creek to Parker Creek from 1981 - 1994. These data were collected using two methods: punch card and hatchery rack/weir. (For more information on these data, contact the NMFS Habitat Conservation Board.)

The ODFW is making major efforts to restore Oregon coastal wild coho. Actions include reductions in harvest rate through fishery closures, and selective fisheries for fin-clipped hatchery coho which are expected to be in place by 1998. Other actions include modification of hatchery programs to reduce interactions between wild and hatchery fish, and efforts to restore and protect habitat.

Winter Steelhead

The North Fork Alsea has both a major hatchery that produces primarily steelhead as well as some of the best habitat for wild winter steelhead in the Alsea Basin.

Winter steelhead follow a similar pattern as the coho salmon, with early hatchery runs entering the river in mid-December to mid-March. The "wild stock" runs are from March to April.

Winter steelhead inhabit approximately 32 miles of stream within the drainage, where they have a varied spawning distribution, from mainstem to the smallest accessible tributaries, including high gradient streams. The distribution of winter steelhead trout is similar to coho salmon. Winter steelhead fry rear primarily in riffles while juveniles usually rear in riffles and well-oxygenated pools. Adult steelhead require suitable gravel beds for spawning, but relatively deep water with cover for holding and resting. Coastal winter steelhead have been petitioned for federal listing as threatened species under the ESA. There is considerable information on Alsea winter steelhead; however, it comes mostly from research on the hatchery program so it cannot be used to directly determine status of wild fish. The presence of large numbers of hatchery steelhead in Alsea fisheries and natural spawning areas also makes it more difficult to clearly describe the status of wild steelhead.

By 1964, Alsea Hatchery began producing smolts for release in the lower Alsea as well as streams throughout the mid-coast. These releases caused high levels of returns back to the Alsea Hatchery and straying into natural production areas within the Alsea.

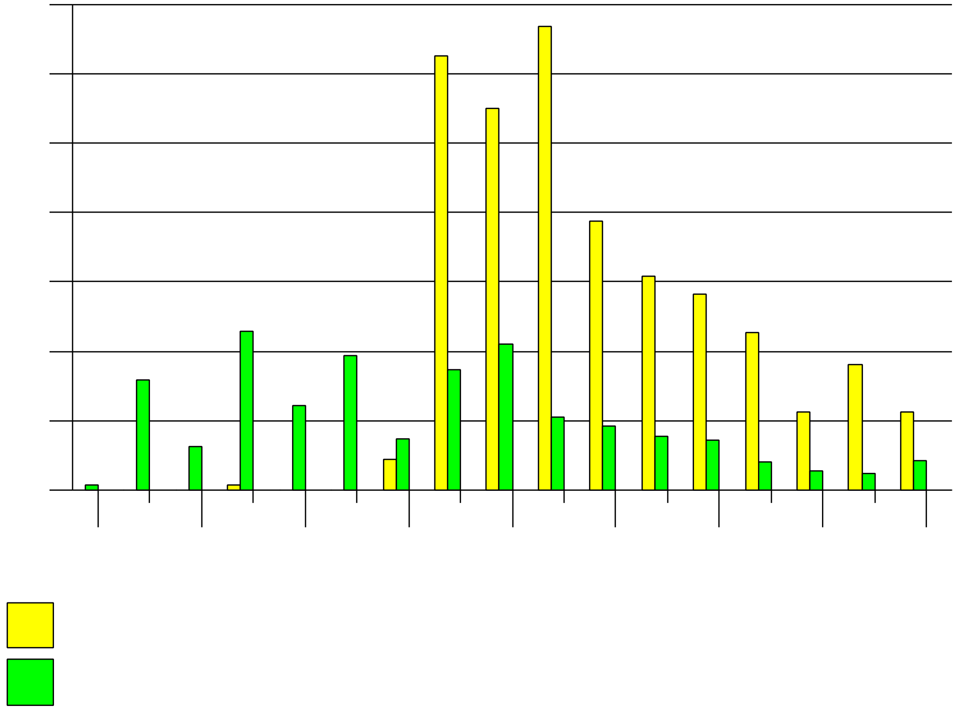
The fish ladder at the Alsea Hatchery was operational until at least 1964. Wild steelhead returns to a trap installed in the fish ladder just upstream from the hatchery averaged 361 fish from 1953 - 1962 (Wagner 1967). Returns during this time period provide a reasonable estimate of wild winter steelhead production potential above the hatchery.

ODFW interpretation of data gathered over an extensive period is that production of both wild and hatchery steelhead has declined in recent years.   The steelhead hatchery returns database from the Oregon Rivers Information System and Oregon Salmon and Steelhead Catch Data Reports also shows a decline (see figure 4.16).

During the years 1991-1994, ODFW trapped fish in lower tributaries to the Alsea to determine the incidence of hatchery steelhead spawning in the wild. These monitoring sites were on the mid- or lower Alsea basin, and the data from the traps indicate that about 50% of the naturally spawning steelhead are of hatchery origin. Timing of hatchery and wild spawners has considerable overlap. In the N. F. Alsea River, ODFW suspects that due to closer proximity to the hatchery, a higher proportion of naturally spawning steelhead are of hatchery origin.

The ODFW is in the process of re-establishing anadromous fish above the Alsea Hatchery barrier beginning in 1995-96 run year. ODFW is planning on actively transporting wild winter steelhead into the area above the barrier and allowing other species to re-colonize naturally. The active re-introduction for winter steelhead is occurring because the habitat above the hatchery is some of the best steelhead habitat in the Alsea Basin, and is comparatively more suited to steelhead than other species.

Overall, the ODFW is making efforts to recover the wild winter steelhead in the Alsea Basin. Primary actions include continuation of angling regulation requiring the release of all non-fin-clipped steelhead, actions to reduce straying of hatchery fish, improved inventory of wild steelhead, as well as the re-introduction above Alsea Hatchery.



Cutthroat Trout

Adult sea-run cutthroat trout appear in the river possibly as early as late August and run to late April (depending on river conditions), and rest in pools and relatively deep slots. A common practice is to assume that sea-run cutthroat are present unless a barrier is known to exist. Sea-run cutthroat are thought to be found in 18.8 miles of the N. F. Alsea watershed. Creel sampling of the Alsea tidewater sea-run cutthroat fishery indicates a major cutthroat decline since 1970, implying a decline in the N. F. Alsea River run. The catch in mainstem spring trout fisheries is a reflection of hatchery programs, and has declined moderately since 1970. Juvenile cutthroat trout rear in small to large pools; all cutthroat trout depend on good instream structure and heavy cover.

Although there are many miles of stream in the watershed unaccessible to anadromous salmonids, they still provide fair to good resident trout habitat. Tributary streams in the upper areas of the watershed support populations of resident cutthroat trout, including above manmade and natural barriers to anadromous fish and in second order streams. This species is the only indigenous salmonid above the falls, and is assumed to be present in nearly all perennial and some intermittent streams. Cutthroat are found in approximately 207 miles of streams within the watershed. Cutthroat trout spawn in low to medium gradient tributaries in relatively fine gravels, and their fry rear primarily in riffles and small pools. It is unknown if the wild cutthroat trout below the hatchery are sea-run, fluvial or resident.

Creel surveys for wild resident cutthroat in Klickitat Lake since 1980 indicate the population is stable, and is similar to the stable cutthroat fishery in Slide Lake, located on Drift Creek, a tributary to the lower Alsea.

The ODFW management direction for cutthroat trout is to sharply reduce or eliminate the hatchery releases into coastal streams, including the Alsea. This hatchery production will be shifted to lakes and reservoirs where potential impacts to wild fish are avoided and angler returns are higher. Angling regulations for cutthroat will generally remain similar to current ones except that retention of cutthroat trout during winter steelhead fisheries will be eliminated.

Lamprey Eels

Adult lamprey have declined sharply in Oregon coastal streams since the early 1970s. An indication of this decline in the North Fork Alsea is the reduced numbers observed at the hatchery. Hatchery personnel report that in recent years they sometimes do not see any. In 1995 three adult lampreys were observed; in contrast, during the 1970s, hatchery personnel reported that lamprey were much more common. This is similar to observations along the entire north-central Oregon coast. The declines could be attributed to changes in freshwater habitat, ocean currents, marine mammal predation, etc. Current thought is that these declines are not a result of complications associated with hatchery fish or angler harvest.

Habitat condition

The Alsea River basin stream gradient is considered moderate. Stream gradient is moderate from the mouth of the N. F. Alsea River to the mouth of Racks Creek. The N. F. Alsea River gradient increases above two 15- foot falls which are located just above Racks Creek, and then the river becomes a sluggish stream flowing through swampy terrain to the mouth of Klickitat Lake. Habitat in this section of the river is considered marginal. Dense growths of alders, willows, salmonberry, and other brush along the stream generally provide good shade.

The N. F. Alsea River Habitat Analysis Report (House 1986) evaluated stream reaches and tributaries above the dam on the North Fork Alsea River drainage. In this report, the river is described in six reaches of the mainstem and five major tributaries (Bailey Creek, Easter Creek, Parker Creek, Chittum Creek and Racks Creek). Each evaluation was based on four factors: rearing habitat, spawning habitat, riparian zone and obstructions. (see North Fork Alsea River Habitat Analysis Report, 1987).

Many of the streams in the N. F. Alsea River have not been surveyed for many years. The most recent data available were obtained on private land owned by Starker Forests, Inc., and Willamette Industries. Most of these were habitat surveys conducted by A. G. Crook Company, using the ODFW methodology, and showed that habitat was dominated by riffle, rapid and cascades types. Pool-type habitats, backwaters and dams provided approximately 15% of the habitat.

These surveys also showed that there was a lack of LWD throughout the drainage. A detailed description for the major streams within the N. F. Alsea watershed describing aquatic habitat and habitat condition can be found in Appendix 4, Habitat and Habitat Condition. A list of the major obstructions recorded in watershed surveys (1985, 1986 &1995), are listed in , Appendix 4, Table 3.

Potential Fish Habitat

Using the concept of "productive flats," the N. F. Alsea River has a total of 56.5 miles of stream with high potential for fish habitat (see Appendix 4, Map 15). These flats are found in unconfined low gradient streams, with Honey Grove Creek and Seely Creek being the subbasins that provide the largest area of productive flats. Map 15, shows streams with potentially good anadromous fish habitat although utilization by anadromous fish is not known. Stream conditions are continually changing and some temporary barriers to fish migration listed during historic surveys have probably been washed out by subsequent freshets or the flood of February, 1996.

Higher gradient streams or streams confined by narrow valleys certainly produce anadromous salmonids and are important from a watershed perspective, but they generally have less potential to produce fish than low gradient, unconfined areas. Steep, confined streams tend to be relatively straight with a few large, deep pools. These stream channels turn into raging torrents during high water flows. The powerful streams carry away woody material and the finer substrate materials. With few refuges available in which to escape the high flows, small fish are flushed downstream. Pools formed by debris jams are often the most productive areas in these systems. This is the case with that portion of the watershed that lies above the fish hatchery located on the N. F. Alsea.

TERRESTRIAL DOMAIN

The current condition of the terrestrial domain is the result of many interacting ecological and human processes as described in the Reference Condition. The most striking difference in the Current Condition is the prominence with which human processes have come to dominate this ecosystem.

Soils

As a result of soil disturbance from roads and logging over the past several decades, some hillslopes within the N. F Alsea watershed are currently degraded. Landsliding rates are related to hillslope steepness and high precipitation rates over short periods. Using these data, a landslide hazard map was constructed, (see Appendix 4, Map 16); Landslide Potential Map. About 22% of the watershed (9,000 acres, including both public and private lands) consists of lands with a high landslide potential. A study of aerial photos taken from 1950 to 1993 found 64 landslides; 80% of the slides occurred within the high risk area delineated on the map, and 90% were related to roads. Roads constructed before 1964 caused 84% of the slides, but since that time, road standards have improved and fewer high intensity storms have occurred. Fill failures from road surface runoff caused most of the slides during peak precipitation events on newly constructed or poorly maintained roads. Impacts from sediments and debris are high in portions of the Rugged Zone (i.e., Parker, Easter, and Yew Creeks). Since the 1970s, better road location, end-hauling of excess road material, proper culvert sizing, and proper maintenance have helped reduce road failure incidents.

Dry-raveling of loose materials is primarily a physical hillslope process that moves materials downslope and delays vegetative growth. This process is slope driven, and this allows areas at high risk for dry-raveling to be delineated by assessing local topography and soil types. Timber Production Capability Classification (TPCC) data show about 7% (2,700 acres) of the watershed where dry-raveling is probably active. Lands in several areas outside BLM ownership are currently experiencing active dry-raveling. These areas have been located from aerial photos and include hillslopes in the Upper Basin Zone, upper portion of the Rugged Zone, and the middle portion of Earnest Creek which lies in the Early Logging Zone . Most of these sites contain shallow soils and offer few rehabilitation opportunities except for long rest periods between site disturbance.

Loss of soil productivity occurs primarily from the following activities: 1) soil displacement and/or compaction from ground-based yarding equipment; 2) scarification and site preparation; and 3) organic matter losses from soil displacement and slash burning. Most serious productivity losses from soil displacement and depleted organic matter occur on shallow and moderately deep soils; most serious productivity losses from compaction occur on the most productive lands.

On BLM lands the TPCC data show about 2,200 acres of shallow gravelly soils and about 1,300 acres of nutrient-deficient lands. About 600 acres of land has been tractor yarded during the past 25 years on BLM ownership, while larger quantities of these land types exist on other ownerships. Since the 1970s, steeper terrain and operating restrictions have greatly reduced the use of ground based equipment and most new soil compaction is mitigated.

Fire and Vegetation

Role of Fire

The natural fire regime across the Coast Range landscape has been greatly influenced since settlers began moving into this region in the mid-1800s. With settlement also came logging. These two factors have had a major effect on the seral stage distribution, species composition, patch size, and spatial configuration on our present day forests. In the last 20 years, the incidence and effect of wildfires within and around the N.F. Alsea watershed has been minimal as fire suppression policies have acted to minimize all non-prescribed fire.

The major use and impact of fire has been directly related to timber harvest activities wherever prescribed fire has been the preferred method for treatment of logging slash and brush following clearcut harvests. As such, the patch size of these modern "stand replacement events" has corresponded to that of harvest units. On federal land, clearcut units have ranged from about 10 to 70 acres, with 30 acres being about average. On private and state lands, the unit size is generally much larger, often up to 120 acres, with an average around 50 acres. Smoke management restrictions have steadily forced reductions in unit size, fire intensity (tons/acre consumed) and total acres burned. Twenty years ago, nearly all burning was done in the fall when the large fuels were dry, resulting in high fuel consumption and severe effects on soil and coarse woody debris. In the past decade, the preferred burning season has changed to the spring, resulting in much less impact to these resources.

Over several decades, the absence of both wildfires and the burning of pasture for livestock has lead to the natural transformation of the "fern openings" and mountain top "grassy balds;" this transformation can be observed at many locations throughout the watershed. The forest edges are encroaching upon the open areas, converting them from grass, ferns and low shrubs back to forest. In some areas, this process has been hastened by planting of conifers by landowners.

In the first half of this century, extensive railroad logging created large open patches and left behind significant amounts of cull material and large snags. Many of these areas were subsequently burned over. Much of the eastern third of the watershed (Early Logging Zone) was logged in this way. These early large contiguous burns could be considered a much closer replication of natural processes than the more recent practice that produces smaller harvest units, lower coarse woody material levels, and lighter fuel consumption.

Overall, current fire conditions differ considerably from the natural range of conditions. Most notable is the greatly diminished patch size of current burns compared to the natural condition. Fire intensity of current burns is generally less than would be expected for wildfire events of the past, but probably fits within the lower end of the range.

Residual fuel profiles of current burns would rate on the high end for fine fuels (because of the lower intensities), but on the lower end of the range for large material remaining (due to removal during logging).

Current Vegetation

Western hemlock\Douglas fir forests represent the major vegetation association within the watershed. Two of the most prominent western hemlock plant communities are the Douglas-fir/red alder/vine maple (D/RA/VM) and the Douglas-fir/red alder/salmonberry (D/RA/SM) types, refer to Appendix 4, Plant Association. The latter grouping generally occurs on wetter sites than does the former. Within both of these communities the major conifer species are Douglas-fir, western hemlock, and western red cedar. Red alder and big-leaf maple are the dominant hardwoods. Predominant shrubs in the D/RA/VM type include vine maple, red huckleberry, and salal; whereas, the primary species in the D/RA/SM type include salmonberry, red huckleberry, salal, and vine maple. Drier sites within the D/RA/VM type often have more ocean spray and chinkapin than moist sites. Removal of the conifer overstory in the D/RA/SM type generally results in rapid site domination by red alder and salmonberry. The herb layer in the D/RA/VM type is dominated by sword fern and oxalis; and in the D/RA/SM type by sword fern.

Several special plant communities exist in the N. F. Alsea watershed including noble fir associations, seasonal and permanent wetlands, wet and dry meadows (grass balds), and/or shallow soil/rocky areas. These special plant communities offer unique habitats for both plants and wildlife, increasing the diversity of the watershed. However, the extent of these habitats in the watershed is poorly understood. Preliminary estimates for these special areas, based on TPCC data, are as follows: 750 acres of seasonal wetlands (including some riparian hardwood communities); 74 acres of permanent wetlands; 6 acres of wet and dry meadows; and 351 acres of shallow soil/rocky areas (including oak/madrone woodlands). These estimates cover only BLM lands, so the total area for each of these plant communities for the watershed is well under-estimated. For example, dry meadows occur at the higher elevations of Mary's Peak and Grass Mountain on a variety of ownerships (see discussion of Special Botanical Areas below).

Those plant communities associated with the lowest elevations in this watershed (oak/madrone woodlands and natural meadows) have been greatly diminished as a result of human settlement and agricultural use of the valley lowlands. As noted earlier, past fire regimes helped perpetuate oak woodlands and natural meadows by removing competing vegetation. The recent exclusion of wild fire (1950s to present) due to more intensive and effective fire restriction measures has likely increased the shrub component of natural meadows, and increased the conifer component of the oak stands.

The current condition of the vegetation is summarized across all plant communities as shown in Table 4.4 (also see Appendix 4, Map 17, Map of Current Vegetation Classes on BLM Lands). The vegetation classes reflect a combination of vegetation types (e.g. conifers, hardwoods, grass/forb) and seral stages (roughly equivalent to age-classes) within a vegetation type. Conifer forests make up the majority of the current vegetation classes (72%) within the watershed. Hardwood stands, which account for only 8.8% of the watershed, are usually interspersed within the conifer stands or occur as linear shaped habitats along the larger streams. It is important to note that the oldest seral stages (forest stands >120 years old) currently represent only 4.3% of the watershed, while the younger seral stages (non-forest habitats and forests < 50 years old) account for almost a third (31%) of the watershed.

In the past, forest management on federal lands has been typically involved 80-year rotations. Approximately two snags per acre were retained on harvest units, although this was not always achieved, and riparian buffer zones approximating 80 feet were retained around perennial streams. The primary factor impacting future vegetation patterns within the watershed is the change in management direction on federal lands from timber production (i. e., clearcut harvesting of oldest stands first) to the development of late-successional forest habitat.

Table 4.4. Current conditions of vegetation classes within the N.F. Alsea Watershed.

Vegetation Classes	***Federal Ownership*** [1] **acres**	**%**	***Total Watershed*** [2] **acres**	**%**
Bare Ground	163	0.7	1,224	2.9
Grass/Forb	677	3.2	3,582	8.6
Shrub/Sapling	1,082	5.2	3,106	7.4
Early Seral Conifer (age 15-40 years)	7,128	33.9	12,241	29.2
Mid Seral Conifer (age 50-70)	4,487	21.4	10,618	25.3
Late Seral Conifer (age 80-120)	4,595	21.9	5,632	13.5
Old-Growth Conifer (> 120 years) [3]	1,524	7.3	1,796	4.3
Young Hardwoods (15-40 years)	208	1.0	1,117	2.7
Mature Hardwoods (> 40 years)	1,149	5.4	2,552	6.1
TOTALS	21,003	100	41,868	100

1. Federal lands include both BLM and Forest Service lands within the watershed. Percentages shown are relative to the total amount of federal land.
2. Total watershed vegetation includes all lands within the watershed.
3. This age-class combines some older late-successional forests (120-160 years old) and "classic old-growth" (>200 years old).

Vegetation Management on Non-Federal Lands

Private industrial forest lands are managed in accordance with the State of Oregon's Forest Practices Act (FPA). It is assumed that future management of these lands will also follow FPA regulations in place at time of harvest. While management strategies vary between ownerships, the general trend on industrial forest lands within the watershed is to manage all stands with a 35 to 60 year rotation schedule, and to control competing vegetation by the application of herbicides. On these lands, approximately two trees per acre are retained following harvest for use by wildlife. These trees are commonly located on the edge of units and/or next to riparian buffers. Under existing FPA standards, the riparian buffers may decrease in width in the future because riparian widths are based upon the amount of tree volume (especially conifer basal area) adjacent to the stream channel. As tree volume adjacent to the stream increases, more trees can be cut and consequently, riparian buffer zones may decrease in width.

Small landowners in the watershed typically manage their lands for agricultural products, timber, or firewood. The management strategy for these lands often differs considerably from industrial landowners and is more variable, being based on individual considerations. Within this watershed, small landowners control approximately 4,360 acres, over 60% of this is accounted for in the agricultural lands of the Alsea Valley.

Plant Species of Concern

Within this watershed, plant species of concern are defined as follows: listed, proposed and candidate species being reviewed under the Endangered Species Act; sensitive, assessment, and tracking species identified by BLM policies; Special Attention Species identified in the Salem District RMP; and uncommon and special interest plant species afforded protection under State of Oregon statutes. A review of various agency records and range maps showed that no federally listed species are presently known to occur within this watershed. The loose-flowered blue grass (*Poa laxiflora*), a BLM Tracking species, is known to occur at 22 sites in the watershed (see Appendix 4, Map 20, Known Sites of *Poa laxiflora*). The Oregon Coast Range represents the center of distribution for this species and contains the majority of known sites. Threats to this species are now minimized on federal lands due to reduced clearcutting of forests.

There are several non-vascular plants (fungi, lichens, and bryophytes) that are considered Special Attention Species (SAS). These species are to be protected by survey and manage (S&M) guidelines identified the Northwest Forest Plan (NFP),(1994; see Table C-3 in the ROD). Appendix 4, "Rod Species Occurrence" in the Coast Range, lists the likelihood of occurrence for S&M species within the N. F. Alsea watershed. A complete understanding of the current distribution is unavailable for many of these species. Based on records from the Oregon State University, the following species are known to occur in the watershed in T12S, R7W: *Boletus piperatus, Cudonia monticola, Gastroboletus turbinatus, Gomphus clavatus, G. floccosus, Gymnomyces sp.. nov.* # Trappe 47, *Leucogaster citrinus, L. microsporus, Martellia idahoensis, P. californica, P. fallax, P. kauffmannii,* and *Rhizopogon exiguus.*

The following factors have contributed to our limited knowledge about these species:

Survey and inventory has predominantly been limited to vascular plants.
Sightings are few and widespread for some species, indicating large gaps in range information.
Only the most rudimentary of ecology data is available for many species; therefore, habitat requirements are essentially unknown for most of these species.
Sighting location information is often general, lacking specific information to permit adequate follow-up surveys.

The N. F. Alsea watershed contains a few plants species that are considered uncommon and of special interest. Some of these species are protected under the Oregon Wildflower Law (State of Oregon 1963) which makes it unlawful to export or sell or offer for sale or transport certain plant species. Some of these species likely to occur in the N. F. Alsea watershed include members of the following genera: *Calochortus*, *Calypso*, *Erythronium*, and *Rhododendron*.

Noxious Weeds

Certain invasive plant species, listed as Noxious Weeds by the Oregon Department of Agriculture (1994), are known to occur in the N. F. Alsea watershed. They include Canada thistle (*Cirsium arvense*), bull thistle (*C. vulgare*), Scotch broom (*Cytisus scoparius*), St. Johnswort (*Hypericum perforatum*), and tansy ragwort (*Senecio jacobaea*).

Canada and bull thistles, St. Johnswort and Scotch broom are well established and widespread throughout the Marys Peak Resource Area as well as the entire Salem District. Eradication is not practical using any proposed treatment methods, but treatment emphasis is shifting toward the use of biological control agents. Populations of tansy ragwort have been partially contained as a result of biological control efforts. Populations primarily occur in disturbed areas, such as roads and landings.

Special Botanical Areas

Two sensitive botanical areas occur within the N. F. Alsea watershed: 1) Grass Mountain Research Natural Area (RNA), an Area of Critical Environmental Concern (ACEC); and 2) Mary's Peak Outstanding Natural Area (ONA), also an ACEC. The former site is located in Section 21, T13S, R8W about five miles due northwest of Alsea. The latter site occurs in Sections 20, 28, and 29, of T12S, R7W, about nine miles west and south of Philomath; much of the land surrounding the BLM-administered land at Mary's Peak is part of the Siuslaw National Forest.

Grass Mountain

In the early days of settlement, ranchers drove their livestock to the top of Grass Mountain to graze. This practice subsequently died out, but was resumed during the years 1954 to 1974 when grazing permits were issued to a local rancher. A State Forestry fire lookout tower was built on the top of Grass Mountain in the late 1930s, and oblique photos taken from the lookout tower in 1934 (U.S. Forest Service) reveal that many of the nearby ridgetops were vegetated with grass. Over the years, Grass Mountain has been popular with hunters, hikers, sightseers, and picnickers, and more recently it has become popular for all-terrain vehicle use.

Grass Mountain is an excellent example of the grass bald communities typical of the Oregon Coast Range. About 20% of this ACEC is composed of eight grassy bald areas, while the remaining 80% is forested in mature noble fir and Douglas-fir stands (70 to 80 years old with some remnant old growth trees) . Two grass\forb vegetation associations, the *Lomatium martindalei* and the *Elymus glaucus*, and two seral communities, *Carex rossii* and *Viola adunca*, are found on the balds. The forested areas cover all aspects at varying elevations and slopes, forming mesic habitats common in the Coast Range. The western hemlock-Douglas-fir/rhododendron/Oregon grape association is found on eastern and southern slopes. The margins of the balds support a western hemlock/vine maple/salal association which is currently dominated by noble fir. Noble fir also dominates the western hemlock/salal/sword fern communities on north-facing slopes. The noble fir is near the southern limit of its distribution in the Coast Range. Vegetation management concerns include: 1) introduction of exotic plants and animals; 2) protection of the grass bald area from encroachment by adjacent forest; 3) disease or insect impacts on plant communities; and 4) human impacts on plant communities.

Mary's Peak

In 1977, the Forest Service (USFS), Siuslaw National Forest, released its Mary's Peak Planning Unit Final Environmental Statement. This document identified 838 National Forest acres and 115 BLM acres suitable for designation as a Scenic Botanical Special Interest Area (SBA). This included those BLM parcels which later became the Mary's Peak ONA/ACEC. The USFS recommended this special area designation based on the area's significant plant communities, its unique scenic quality as the highest peak in the Oregon Coast Range, and its high recreation value and heavy recreation use. Because of the association of the BLM parcels with Siuslaw's SBA proposal, and recognizing the unique plant communities of Mary's Peak, BLM established the Mary's Peak ONA/ACEC for 105 acres in the Westside Timber Management Plan Record of Decision (1982). In its 1986 Proposed Land and Resource Management Plan, the USFS proposed that the Mary's Peak Scenic Botanic Special Interest Area be established, a designation which was achieved with completion of the Siuslaw National Forest Plan.

The BLM-administered parcel near the summit of Mary's Peak contains several unique botanical areas: 1) a large bald meadow which is one of the best examples of a red fescue (*Festuca rubra*) meadow in the Coast Range; 2) a dry, subalpine rock garden with southwesterly aspect and thin soils derived from weathered igneous rock (several high-altitude species found here, including *Eriogonum umbellatum* var. *hausknechtii*, are separated from their normal range by about 70 miles); and 3) a noble fir (*Abies procera*) community. The larger BLM-administered plot in section 20 is on a steep slope with high rocky benches. The southernmost plot contains a first- order stream on steep, densely forested terrain.

Of the four BLM parcels in the Mary's Peak ONA/ACEC, the parcel near the summit receives the most human use because of its accessibility and panoramic view, and is thus most susceptible to site damage. Heaviest concentration of users in the ONA/ACEC occurs in sections 21 and 28 during the summer and during winter when snow accumulations are adequate for visitors to participate in winter sports activities. Vegetation management concerns include: 1) introduction of exotic plants and animals; 2) protection of the grass bald area from encroachment by adjacent forest; 3) disease or insect impacts on plant communities; and 4) human impacts on plant communities.

Wildlife Habitat and Species

Late-Successional and Old-Growth Habitat

The major issue concerning wildlife habitat at the regional scale is the depletion of late-successional and old-growth forests (LS/OG; conifer stands Æ80 years old) that has occurred across the entire Coast Range Province. This concern has been the main focus of many recent scientific assessments and planning documents for this region [see Thomas et al. 1990, Johnson et al. 1991, Noss 1993, Thomas et al. 1993, USDI-BLM 1995 (Salem District RMP), USDA-FS and USDI-BLM 1994 (Northwest Forest Plan)]. Forest management during the past century, and particularly within the last few decades, has been focused on the liquidation the older forests, in an attempt to attain a regulated forest with an equal distribution of all age-classes within a rotation schedule of 80 years or less. This direction, along with ever-changing approaches to size and spacing of harvest units, has had the effect of greatly depleting and fragmenting the LS/OG habitat. The pertinent ecological and biological processes related to wildlife habitat within this watershed have been discussed thoroughly at the regional scale in the above mentioned documents, and have been outlined in the discussion of Reference Conditions in Chapter 3.

Harvesting patterns, road building, and large fires of the mid-1800s have produced a mosaic of small patches of LS/OG scattered across the watershed mostly on federal lands. Where older forest patches are surrounded by contrasting habitats (e. g., recent clearcuts, young stands), the edges of the older forest patch usually exhibit environmental conditions that are markedly different from the interior of the LS/OG patch. In addition to the differences in microclimate(e. g., humidity, temperature regime, light penetration) that exist between the edge and the interior of a patch, edge habitats often have a greater diversity of competitor species and predators than the interior of a patch. Thus, it is reasonable to expect that as the distance between older forest patches increases, and the proportion of edge to interior habitat increases, animals that are strongly associated with older forest habitats will be adversely affected. There is no consensus on how far "edge-effects" from open and young stands extend into a LS/OG patch.

Edge effects may be perceived very differently depending on the species under consideration. In this analysis, an attempt was made to model edge-effects on LS/OG with the following constraints: (1) high contrast habitats were assumed to produce edge-effects extending 400 feet into adjacent older stands; (2) moderate contrast habitats (e. g. mid-seral conifers and mature hardwoods) were modeled with a 200-foot edge-effect, and (3) in some cases very small moderate contrast patches were modeled to have no edge-effect on LS/OG habitat, especially when these patches were small (< 3 acres), narrow, and totally enclosed by LS/OG.

While 7,428 acres (private and Federal) of LS/OG habitat exists in the watershed (about 18% of the watershed), only 2,099 acres of this habitat (about 5% of the watershed) is considered to have interior forest conditions. This points to the highly fragmented nature LS/OG forests in this watershed, which is further illustrated in Appendix 4, Map 19 and Table 4. [LS/OG habitat and Interior Forest Map] The majority (72%) of the interior forest patches were less than 30 acres, with only five of these patches over 100 acres in size. All but a few of these interior forest patches are on BLM lands. The largest patches of this habitat are found in the Rugged Zone with several smaller patches scattered in the Upper Basin. LS/OG forest is almost absent from the Railroad and Valley Zones, yet the few patches that do exist represent the oldest forest age-class found in the watershed.

The LS/OG forests occupy 29.2% of the federal lands within the watershed. Most of this habitat is composed of forests that are 80 to 120 years old, with only about 3.8 of the federal lands composed of "classic old-growth" (>200 years old). All of the LS/OG forest on federal lands fall within LSR and Riparian Reserve land allocations. When viewed from the larger landscape perspective the LS/OG forest patches in the Upper Basin and Rugged Zone are aligned in a corridor of stepping stones that link LS/OG habitat to the west and south of the watershed with similar habitat to the northeast of the watershed. This corridor affords an important avenue of dispersal across and through the watershed for highly mobile older-forest associated species. Larger patches within this corridor may also function as refugia for less mobile species that depend on older-forests.

Structural Components of Forest Habitat

The structural features available within a given seral stage patch often determines whether certain wildlife species are able to utilize that habitat. Thus, the quality of wildlife habitat often depends on more than just the quantity of various seral stages. Natural ecological processes (e.g., fire, windstorms, disease, advanced age) have tended to build structural features into forest stands. Whereas, past management regimes have generally hindered or precluded these processes. Prioritizing harvest to oldest stands first, mortality salvage programs, snag hazard contracts, and thinning prescriptions that eliminate suppressed trees and minor species are all examples of a past management paradigm that greatly reduced structural diversity and species composition in Coast Range forests. While recent harvest technologies have improved to lesson ground disturbance impacts, these same efficiencies as well as market considerations have tended to leave fewer snags and less coarse woody debris on harvest units.

The structural components of forest stands that are of most concern within this watershed are: standing snags, coarse woody debris (down logs), sub-canopy layers, and tree species diversity. Limited inventory work and local knowledge of this area suggests that all these structural features currently exist at very low levels in the young forest stands (15 to 40 years old) in the watershed. Some notable exceptions to this occur in the Railroad zone where many mid-seral forest stands have high levels of down wood in advanced decay stages. Greater amounts of structural components can be found in the late-successional forests typical of the Upper Basin and Rugged Zones. At higher elevations in these stands there is considerable species diversity and sub-canopy development. Evidence of structural diversity can be seen in recent aerial photos (1993), where several clusters of recently dead trees (several trees to ½ acre patches) are scattered throughout the older forest stands in these zones. These patches are likely caused by a combination of insects, disease, and moisture stress resulting from the past several years of below average rainfall (photos of the same area from 1988 show no sign of these patches). Also in this zone, there are a few scattered snag patches around the edges of past harvest units which have resulted from escaped prescribed burns.

Special Habitats

Special habitats within this watershed (e.g., wetlands, meadows, rocky outcrops, etc.) support a unique variety of wildlife species. Within this watershed a variety of wetland habitats are found such as seeps, springs, ponds, marshes, and swampy areas. Wetlands along the upper segments of the North Fork Alsea River, and forested seeps and springs in the upper reaches of all subwatersheds currently provide habitat to a wide range of wildlife species (primarily amphibians, small mammals, and some invertebrates). In addition, rocky outcrops, talus slopes (Mary's Peak), oak/madrone patches, and grassy balds (Mary's Peak and Grass Mountain) provide much of the existing diversity of special habitats within the watershed. Unfortunately, there is little data available to provide a good estimate of the abundance of special habitats. An attempt was made to capture some of this habitat diversity when the vegetation coverage was created for this analysis, but without extensive field checking, much of this diversity remains unknown.

Road Density

One of the major factors affecting the use of habitats by wildlife is road density. The average density of road miles with the watershed (5.8 mi/mi^2) is much higher than the desired road density (1.5 mi/mi^2), as recommended by Oregon Dept. of Fish and Wildlife (ODFW 1990). This average density is rather high even for the Oregon Coast Range where high road densities are quite typical. It is important to note that estimates of road density may not reflect an accurate density of the total road miles that are open and passable to vehicular traffic. For example, in some areas of the watershed, road density may be higher due to roads on private lands or trails created by off-road vehicles (ORVs) that are not accounted for in BLM inventory data. Also, many of the spur roads within BLM inventory data may in fact be impassible due to ingrowth of shrubs and young trees in the roadway.

Wildlife Species of Concern

The management direction outlined in the Northwest Forest Plan and Salem District RMP is specifically designed to benefit a great diversity of wildlife species, especially those associated with old-growth forests, like the marbled murrelet and the spotted owl. By addressing broad issues concerning wildlife habitat, it is hoped that the overall diversity of wildlife species within this watershed will be maintained. However, concern for the regional viability for many species has been raised in many of the recent planning documents and scientific assessments (see Thomas et al. 1993, USDA-FS and USDI-BLM 1994, USDI-BLM 1995). These species are listed in Table C-3 of the Record of Decision (ROD) for the NFP. For a great number of these species, key life-history information (e.g., habitat relationships, population size, distribution) is poorly known; and therefore "educated guesses" regarding viability are limited to the regional scale for many species. In addition to those species listed in Table C-3 (herein referred to as "Special Attention Species" [SAS]), there are several species likely to occur within the Coast Range that are listed or being reviewed for listing (candidate species) under the Endangered Species Act. Also within the Coast Range there are species for which there is significant local concern related to social, economic, or cultural issues. For all these species, collectively referred to as "Species of Concern" (including listed, candidates, SAS, and species of local concern), it is assumed that their population size and distribution will be benefitted or limited by the amount and trend in their preferred habitat.

Within the terrestrial ecosystem of this watershed 19 vertebrate and 8 invertebrate species are considered Species of Concern. Refer to Appendix 4, "Supplemental Wildlife Information", for a list of the species that were considered in this analysis. The status of each of the Species of Concern is discussed below.

Amphibians: The red-legged frog, tailed frog, and southern torrent salamander are candidate species known to occur within the watershed. All of these species are closely associated with riparian habitat. The tailed frog and southern torrent salamander are closely associated with clear, cold headwater streams, springs, and seeps. The red-legged frog is more often found in larger streams and wetlands. Conditions of upland habitats are important for the red-legged frog and tailed frog which often move through the terrestrial ecosystem when dispersing. Regionally the populations of these species are believed to be declining, due to loss riparian habitat and loss of key components from the terrestrial system (e.g., large LS/OG patches, coarse woody debris). The most protected headwater streams in the watershed are found in Parker Creek, although many of the remaining LS/OG patches contain seeps and springs that are suitable for these species. Limited survey information for these species suggests that they are currently well distributed through the Upper Basin and Rugged Zone. Due to the extensive early logging activity that impacted most of the riparian areas and wetlands in the Early Logging Zone, populations of these species may have been displaced or became quite localized.

Northwestern Pond Turtle: The pond turtle is a rare species, that prefers the habitat of marshes, lakes, ponds, and slow-flowing rivers and creeks. It uses terrestrial habitats for nesting, overwintering, and dispersal.

This species is sensitive to loss of habitat and human disturbance. Additionally, the recruitment of young turtles into the population may be limited by introduced predators, such as the largemouth bass and bullfrog. The nearest known location of this species is the Findley Wildlife Refuge, located 6 miles to the east of the watershed. Places like Klickatat Lake and the low gradient stretches along the upper portion of the North Fork Alsea River may offer relatively undisturbed habitat that may be suitable for this species. None of these potential habitats have been surveyed for this species.

Northern Spotted Owl: The BLM first began surveys for spotted owls in this and adjoining watersheds in 1975. Since 1986 the yearly surveys efforts have been fairly consistent, and a banding program was implemented to allow for identifying individual owls and tracking their yearly survival and reproduction. The spotted owl's preferred habitat for nesting, roosting, and foraging (NRF) is late-successional and old-growth forests. About 18% (7,450 acres) of the watershed is currently in NRF habitat. Much of this habitat is late-successional forest (80 to 120 years old) and surveys of this habitat have not detected many owls. Almost all (82%) of this existing habitat is well protected by federal land-use allocations (i.e., LSR, Riparian Reserves). Most of this habitat is also within a critical habitat unit (CHU: OR-47) that has been designated for spotted owl recovery. There are three owl sites within the watershed boundary. All of these sites have less than 40% suitable habitat within their median home range radius (MHR: 1.5 miles) of their site centers (MHR percentages were 35%, 31%, and 14%). Only one these sites has been consistently occupied by a pair of owls. Yet this site has only produced three juvenile owls in the last 10 years, one of these juveniles was known to have died before fledgling. Additional owl sites lie just beyond the northeast and southwest boundary of the watershed where larger patches of NRF habitat are found.

In this watershed and to the north of this watershed, CHUs have relatively few resident owls, and recovery of owl populations here and farther north in the Coast Range will require that juvenile owls produced in CHUs to the south have adequate dispersal habitat to move north. Forest stands having at least an average D.B.H. of 11 inches and more than 40% canopy closure (referred to as the "11-40" condition) are considered dispersal habitat for owls. About 52% of the entire watershed is in dispersal habitat. This habitat is arranged in a pattern of large patches of young forests in the Early Logging Zone which links to the more fragmented and smaller patches of older forest in the Upper Basin and Rugged Zone. Most of the younger forests that contribute to this dispersal corridor lie on Matrix and private lands within the Railroad Zone. About 29% (12,074 acres) of the watershed is composed of dispersal habitat that lies on federal lands which are well protected by land-use allocations (i.e. LSR, Riparian Reserve)

Future management activities on federal lands are not likely to result in the incidental take of spotted owls, since all three owl sites occur on LSR, and loss of suitable habitat or modification of critical habitat is unlikely. In some cases federal management actions might involve projects that pose a risk of disturbance to owls, if such projects are situated within a ½ mile of active sites.

Marbled Murrelet: This species, which flies inland from the coast to nest in late-successional and old-growth forests, has been detected at only four locations within this watershed. The western edge of this watershed lies 21 miles from the coast. There is currently about 7,703 acres of suitable habitat available to murrelets within the watershed. Most of this habitat is late-successional habitat (80-120 years old) which may not yet have developed adequate structure in the upper canopy to allow for murrelet nesting. Very few surveys have been conducted for murrelets in this watershed, but the limited survey efforts thus far have only detected murrelets in the old-growth stands (>200 years old) or stands with an old-growth component, mostly in the western portion of the Rugged Zone. About 80% of the existing murrelet habitat lies in LSR and Riparian Reserves. All of the LSR within this watershed has been proposed as critical habitat for this species.

Future management activities on federal lands are not likely to result in the destruction of murrelet habitat or proposed critical habitat, yet the incidental take of murrelets may still occur if actions that pose disturbance risks are located adjacent to murrelet habitat.

Bald Eagle: Bald eagle sightings within this watershed generally occur in late fall, though winter, and into early spring. Eagles appear to be attracted to spawning salmon runs along the lower portions of the N. F. Alsea River. The few eagles that are observed here, appear to be foraging on spawned out salmon, road kills, and occasionally on carrion encountered on agricultural lands. These eagles also require suitable roosting sites, which are often in the remnant old-growth patches adjacent to the valley margins. It is unlikely that this watershed is capable of supporting a breeding pair of eagles. Although an active nest site is located just to the northwest of this watershed, in the Big Elk Creek drainage. The ability of this watershed to support a small transient population of wintering eagles will likely be enhanced by recovering anadromous fish runs and protecting suitable roosting sites.

Northern Goshawk: This is a candidate species that appears to be declining in many western states due to forest management activities. Although several recent and historic surveys have been conducted for this species in the northern portion of the Coast Range, only two nest sites have ever been documented. Both of these sites were found in 1995 in mid-seral conifer forests in western Lane County (about 10 miles south of this watershed). The habitat at both of these sites is very similar to the mid-seral forests of the Early Logging Zone. While this region of the Coast Range may be at the edge of the species normal breeding range, the discovery of these two recent nest sites indicates that forests in this watershed may be important to this species.

Harlequin Duck: This candidate species is a rare breeder in the Cascades that winters along the rocky shorelines of the Oregon Coast. There is one confirmed breeding record for this species in the Coast Range. There is no survey information or known site locations for this species within this watershed. There are portions of the upper N. F. Alsea River that are relatively free of disturbance and which could provide suitable habitat for this species. Yet, it is unlikely that this watershed will ever become important for recovery of this species, since this duck appears to be a rare breeder at the edge of its range

Red Tree Vole and White-Footed Vole: The red tree vole is a Special Attention Species (SAS), requiring that Survey and Manage (S&M) guidelines be met before initiating ground disturbing projects within suitable habitat. This species is likely to be found in late-successional forests within this watershed. White-footed voles are a candidate species that is documented to occur along the South Fork Alsea River. This species has most often been found along small streams with dominant red alder stands, and usually associated with heavy cover, such as down logs with dense shrubs. This species is among the rarest mammals in the Pacific Northwest, having been collected from only a few sites, including the mixed alder/conifer forest stands near Alsea Falls Park. Connectivity of riparian hardwood stands, and the conditions of coarse woody debris within riparian areas, may currently be limiting factors for white-footed voles in this watershed. Some preliminary surveys for small mammals along Honeygrove Creek failed to record this species among those captured. Forest management activities that affect conditions of late-successional forest, riparian forests, or coarse woody debris will have a high potential for impacting both of these small mammals.

Pacific Fisher: This species appears to be very rare in Oregon, and few records exist for the Coast Range. This species is most often associated with large blocks of forest habitat, and is believed to prefer late-successional habitats which offer adequate structural features (e.g., large snags, down logs) for denning and roosting sites. Statewide, the trapping of this furbearer has been closed since 1937, yet populations have not rebounded. This suggests that other factors such as, habitat fragmentation, isolated populations, and very low reproductive rates may be affecting the viability of this species on a region-wide basis. There is no survey information or known site locations for this species within this watershed.

Roosting Bats: The long-eared myotis, long-legged myotis, Yuma myotis, fringe-tailed bat, and silver-haired bat are all likely to occur in late-successional and old-growth forests within the watershed. Structural features of the older forest stands, including large snags, tree deformities, prominent flaking bark, and thick foliage are known provide suitable roosting sites for some of these species. These bats may forage over a variety of forest stands. Riparian areas with adjacent late-successional forest conditions may be particularly important, since insect swarms associated with a nearby water source can provide good foraging habitat in close proximity to roosting sites. There is no survey information or known site locations for these species within this watershed. The potential impact on these species by forest management activities in this watershed is unknown. But, considering the association of these species with late-successional forests, snags, and riparian areas, the risk of impact is likely to be quite high if these species are present. Surveys for these species will be needed to comply with the S&M guidelines established in the Northwest Forest Plan, and monitoring guidelines set forth in the RMP.

Roosevelt Elk and Black Bear: Populations for both of these game species appear to be increasing within the watershed. Damage complaints to agricultural crops and young plantations also appear to be on the rise for both of these species. Elk damage is especially a concern in the lower portion of the Valley Zone.

There is also concern that current management direction, which emphasizes older forest conditions on federal lands, will further reduce available forage for elk, thereby increasing damage complaints on private lands in this watershed.

Excluding the open agricultural areas of the Valley Zone (about 1,650 acres), there is currently 14% (5,960 acres) of the watershed in potential forage habitat for elk (i.e., recent clearcuts, grass/forb, shrub/sapling stage). This level of forage habitat is below the 20% recommended by ODFW (1990). Thermal cover comprises 31% of the watershed, and is defined as those forest stands greater than 50 years old and less than 130 years old. Optimal thermal cover, which is defined as Æ130 years old, is extremely scarce (only 4.3%) in this watershed and lies almost entirely on BLM lands. The quality of elk habitat is also influenced by its exposure to human disturbance. Elk that use habitats within areas of high road density, are more vulnerable to harassment and poaching. As noted earlier, road density is very high within this watershed.

Invertebrate Species: Very little is known about invertebrates in the forested ecosystems of the Oregon Coast Range. There is a reasonable likelihood that the four SAS mollusc species listed in Appendix 4, Supplemental Wildlife Information**,** may occur within this watershed. These species are most often found in moist forest conditions associated with down logs, riparian habitat, and remnant old-growth patches. The dispersal potential for these species is can be severely affected by the high degree of fragmentation of late-successional forests. Of the four sites where Roth's blind ground beetle have been found, three occur within or immediately adjacent to this watershed. While surveying unsuccessfully for Roth's blind beetle near Prairie Peak (in the South Fork Alsea Watershed), LaBonte (1994) discovered a new species of blind beetle (*Annilodes* sp.). It is highly likely that this new beetle could occur within this watershed; and it may be limited to higher elevation old-growth habitats similar to those on Mary's Peak and Grass Mountain. The Oregon giant earthworm, is likely to occur in stable older soils in this part of the Coast Range. No surveys or locations of this candidate species are known for this watershed.

Chapter V - Interpretation

Human Domain

Introduction

The information in this section is organized according to the four physiographic zones (Valley, Early Logging, Rugged and Upper Basin) described earlier in Chapter 1, and illustrated again in Appendix 5, Map 1. For each zone, "trends, limitations and concerns" are identified and discussed, and then objectives for each are presented. As the map shows, two of the zones, Valley and Early Logging, contain virtually no LSR land, while the other two, Rugged and Upper Basin, contain virtually no Matrix land.

Commodity Forest Products

Railroad Logging & Valley Zones

Because there is very little BLM land (perhaps 200 ac.) in the Valley Zone, and what little there is has similarities to the Early Logging Zone, the two zones are considered together here.

Trends, Concerns and Limitations

The large majority of Matrix lands in the N. F. Alsea watershed are within these two zones so the bulk of timber harvesting on BLM lands will occur here. Considerable potential commercial thinning and some regeneration harvest opportunities exist within the Early Logging Zone. Of considerable interest is the extent to which silvicultural prescriptions, applied in Riparian Reserves primarily to enhance habitat and/or conditions for wildlife and fish, especially anadromous salmonids, can have the secondary effect of yielding commodity forest products.

Future timber sale activity within this zone of influence may provide the opportunity for the correction of negative impacts from past logging practices. Improperly located roads, particularly those in Riparian Reserves, may be decommissioned and their negative impacts may have to be mitigated, and new roads may be located on ridges as part of future timber sale contracts.

Even on the limited BLM land within the Valley Zone, there is potential for significant harvest of special forest products, particularly mushrooms. Whether the levels of this product flow can be sustained over the long-term is not known.

The seral stages of private commercial timber lands are at or nearing points at which they are likely to be harvested in the next 10 to 20 years. Such increased harvesting will have management implications for BLM lands. Extensive harvesting on private lands may have effects on wildlife and/or anadromous fish that will have to be considered by BLM timber sale planners.

Objectives

Maintain or increase the flow of commodity forest products from Matrix lands in these zones.

Carefully consider what logging systems are feasible, especially in sensitive areas such as those in the Valley Zone.

Refine and increase knowledge about the sustain ability of Special Forest Products, especially mushrooms, which are highly productive in the seral stages in the Early Logging Zone.

Assuming careful site-specific analysis is done, consider what silvicultural prescriptions applied to Riparian Reserves could improve habitat and/or conditions for wildlife and anadromous fish while simultaneously yielding commodity forest products.

Rugged Zone

Trends, Concerns and Limitations

The largest share of potential density management opportunities in the watershed is located in this zone, particularly in its northeastern-most part. At the same time, because this zone contains LSRs almost exclusively and is an area of high landslide potential (because heavy rainfall combines with steep ground), there will likely be minimal road construction in support of timber harvest. Relative to the other three zones, the production of commodity forest products from this zone is likely to decrease over time as the LSRs begin to acquire the late seral characteristics desired for them.

Access problems caused by road closures on BLM and/or private lands, combined with the need to achieve the objectives set forth for the LSRs, may require that "light hands on the land" harvest systems be used in order to implement density management here.

Objectives

Use density management to meet the objectives established for LSRs.

Refine and increase knowledge about the sustain ability of Special Forest Products.

Upper Basin Zone

Trends, Concerns and Limitations

All BLM lands in this zone are designated as LSRs, few opportunities for density management have been identified; those opportunities which do exist will be limited over the next decade or two to the youngest age classes. Another consequence of the young age of the stands in this zone is that, relative to the other zones, the production of commodity forest products will be low. As this zone is not in an area which has been identified as having high landslide potential, appropriate cable harvest methods could be employed here.

Objectives

Use density management to meet the objectives established for LSRs.

Refine and increase knowledge about the sustain ability of Special Forest Products.

Special Forest Products

All Zones

Trends, Concerns and Limitations

Interest and demand for SFPs has increased significantly in recent years. Conversations with local purchasers and marketing companies indicate that this trend will continue.

There is very little or, in some cases, no information to adequately assess the current distribution and viability for some of these species. Some general trends, with respect to individual species are likely to result from the projected changes in seral stages i.e. moss may become more abundant due to reduced activity in riparian zones, whereas salal may become less available, on Federal lands, due to fewer regeneration harvest units.

Objectives

Manage SFP species so as not to over harvest or disrupt ecological processes.

Meet increased demand for SFPs from the public.

Transportation

Watershed-wide Objectives

Complete the Transportation Management Objectives (TMO).

The TMO is a process developed to assess each BLM-controlled road in order to: 1) identify road related problems; 2) define the purpose of the road; and 3) determine its potential to impact aquatic systems, with respect to the objectives in the Aquatic Conservation Strategy. Items inventoried included surface type and condition, cut/fill slope condition, culvert condition, ditch erosion, fill heights, adjacent stream types, and stream diversion potential.

With interdisciplinary review the TMO will provide maintenance schedules, improvement criteria, road closure status, inspection and maintenance during storm events, correction of drainage problems, and criteria for regulating traffic during wet periods.

Road and landing locations in Riparian Reserves must be minimized, and watershed analysis must be completed prior to construction of new roads or landings in Riparian Reserves. (This is according to the Aquatic Conservation Strategy objectives; additional considerations for roads management are listed in the ROD [p. C-32-33].)

Road construction will be considered on a site-specific basis addressing: (1) cumulative effects, including potential for sediment production and soil compaction effects on peak flows; (2) connectivity within Riparian Reserves; (3) existing roads for opportunities to close, obliterate, restore, or remediate; and (4) construction of new roads in unstable areas (see Appendix 4, Map 16, Landslide Potential).

Allow enough flexibility within the road maintenance program to deal effectively with unanticipated problems.

Valley Zone

Trends, Concerns and Limitations

There is very little BLM land in this zone (perhaps 200 ac.), so management of the transportation system will continue to have little or no effect on the watershed, and there is very little opportunity for building new roads. However, road construction on BLM land in portions of the Early Logging and Rugged Zones adjacent to the Valley Zone should be highly restricted due to the significant fishery values. It should be recognized that activities or events which occur in one zone can and do have impacts downstream into another zone. For example, wind or flood events could cause upstream road-related failures that would adversely impact the North Fork Alsea River and lower reaches of its tributaries.

Objectives

Roads need to be restored, closed or maintained according to the TMO.

Early Logging Zone

Trends, Concerns and Limitations

Concerns within this zone are related principally to the age of the roads and the out-dated methods by which they were constructed. In addition, because of the high road density in this zone, the cumulative effects of road problems are high here when compared with the other three zones.

Drainage structures are one area of concern. Old stream crossings built of logs are deteriorating and will fail eventually, depositing sediment into streams. Undersized drainage structures in streams may plug with soil, rocks or debris and cause some fill erosion or possibly mass wasting if the streams divert. In particular, roads and trails crossing Crooked Creek will continue to deposit sediment into it if access to the road crossings is not eliminated or proper structures are not installed.

Roads that continue to be unused will overgrow with vegetation and restrict or eliminate vehicle access; if such roads are needed for future harvest or management, they may be costly to reopen. Old unsurfaced railroad grades and roads that are adjacent to and cross streams, if continued to be used as motorcycle trails, will increase erosion and sedimentation into streams.

If BLM's Road Maintenance program continues to experience reduced funding, fewer roads will be maintained, and there will be a decline in the overall quality of road maintenance. At the same time, primary and secondary BLM roads will continue to be relied upon to provide access to large tracts of private timberland. Much of this timberland will be reaching a harvestable age within the next decade or two, and is likely to be harvested. These private operators will build new roads, and may pressure BLM to provide new or improved roads by which to gain access to their lands. This may increase the road density in this zone which already has the highest road density in the watershed.

Objectives

Motorcycle trails need to be inventoried and managed.

New road construction needs to be located in ways which impact streams and other components of the watershed less than the older roads have done.

Completion of the TMO is particularly important for this zone since it is so critical to anadromous fish in the watershed.

Overall road density in this zone should be reduced, including that within Riparian Reserves.

Rugged Zone

Trends, Concerns and Limitations

The average age of roads in this zone is not as old as in the Early Logging Zone, but some of the same outmoded construction techniques were used in their construction. It is very likely that unmaintained sidecast-constructed roads on steep slopes will fail, and those that are adjacent to streams may cause severe sediment deposits or mass wasting. Minor failures have occurred periodically over the past 10 years, and its topography makes this the highest risk zone in this watershed for road failures. Undersized drainage structures will lead to increased maintenance due to plugging. Potential road failures associated with fill overloading on steep slopes and unstable ground will result in extremely high maintenance costs.

Many primary and secondary BLM roads will continue to provide access to large blocks of private timberland and will therefore continue to be high priority for maintenance. At the present time, roads that continue to be unused are overgrowing with vegetation and may close vehicle access; when needed for future harvest or management, such roads may be costly to reopen. Roads to be converted to recreation trails could conflict with roads needed for BLM or private timber management.

Objectives

New road construction needs to be located in ways which impact streams and other components of the watershed less than the older roads have done.

Completion of the TMO is important for this zone because of its high landslide potential and the presence of anadromous fish in some streams.

Overall road density in this zone should be reduced, including within the Riparian Reserves.

Upper Basin Zone

Trends, Concerns and Limitations

Most of the roads in this zone were constructed with more recent construction methods (Best Management Practices), so they should continue to require minimal maintenance with moderate to low costs. An exception is the Sweet Home Creek/Racks Creek area where drainage structures tend to deteriorate rapidly, presumably because of minerals or chemicals in the water. In addition, rain-on-snow events in higher elevations will continue to have the potential to cause problems on steep roads and on undersized drainage structures.

Although the Northwest Forest Plan calls 100-year flood criteria to be applied to drainage structures, those in this zone are currently functioning well. Therefore, this zone will be a low priority for phasing in these better drainage structures as compared to the other three zones.

BLM land with high road densities of exclusively BLM-controlled roads will be candidates for closure to vehicle traffic to enhance wildlife management. Such closures will have to be planned carefully since primary and secondary BLM roads will continue to provide access to large tracts of private timberland.

Objectives

TMO completion is not as high a priority here as in the other three zones because of the more recent construction of the roads and the less severe topography.

Recreation

By virtue of its location and physical features, the North Fork Alsea River watershed could play an important role in providing new recreational attractions, especially high-value loop-trails and overnight facilities, with minor impacts on the watershed's biophysical processes. The demand and need for such regional recreation attractions in the Oregon Department of Parks and Recreation's Regions 5 and 8 is well documented in that department's *Statewide Comprehensive Outdoor Recreation Plan* (SCORP). The demand for dispersed recreation opportunities is growing, and for this watershed, comes primarily from the mid-Willamette Valley. Trail users -- equestrian riders, mountain bikers, and hikers -- desire high-value, multiple-use loop-trails in the Coast Range which are close to home. Trails in the N. F. Alsea watershed would be used by day-use visitors from Corvallis/Philomath and weekend visitors from the mid-Valley. (The watershed is only 12 air-miles from Corvallis [65,000 residents predicted by the year 2010].) Whenever the Cascade Mountains and Wilderness Area trails and campgrounds are overcrowded or closed by snow, these trails could help to meet this demand.

Demand for trails can be inferred from visitor-use data compiled for the McDonald-Dunn Forest, Oregon State University's 13,000-acre research forests near Corvallis. The forest's multiple-use trails have been overcrowded since 1988, when the forests had, it was conservatively estimated, over 33,000 annual trail visits; 89% of trail users lived 10 miles or less from the forest, and over half of them had made six or more trips to it in the previous year. More recent figures (1993-94) show a total of over 47,000 visitor-use days; there is also a rapidly increasing demand for equestrian trails (Degan, pers. comm. 1996).

There are currently no equestrian trails on BLM or USFS lands in the mid-Willamette Valley or Coast Range. The demand for equestrian trails has increased tremendously since the Cascades Mountain Recreation Areas instituted a permit system. Numerous horse clubs have requested information about trails or old abandoned road systems for day rides, as well as requesting where meadow areas might be available for overnight camping. Some groups have gone so far as wanting to "adopt a trail" (or old road system), or offering maintenance services. In response to this demand, some of the local ranchers have offered horse stabling services, trailer shuttles, and overnight accommodations to promote the recreational use of horses near their lands.

There are several new (1-3 years old) interagency plans[6] which address in some manner recreation within areas which include the N. F. Alsea watershed. These various plans discuss the shortage of high-value, multiple-use loop-trails, with supporting campsites, needed to meet the local demand, the multiple-use Corvallis-To-The-Sea Trail, opportunities for the physically disadvantaged, opportunities for hunting, and enhancements to off-highway motorcycle trail areas.

There are no data available for any portions of the N. F. Alsea watershed about the levels of "consumptive" recreational activities such as mushroom hunting, fern, moss and bough gathering, etc. There may be locally heavy impacts from such activities although the impacts are most likely small when compared to those of their commercial equivalents.

Valley Zone

Trends, Concerns and Limitations

Given the virtual absence of BLM land within this zone, there is little to no opportunity for developed recreation in it. At the same time, the small amount of BLM land here is easily accessible to mushroom gatherers, hunters, and others, and should be monitored carefully with respect to these kinds of consumptive activities. Fishing access is confined to private property as is whatever equestrian or OHV activities which may occur in this zone. There is virtually no camping in the Valley Zone.

Early Logging Zone

Trends, Concerns and Limitations

The use of the Greasy Creek/Gleason Creek OHV area by motorcyclists has been relatively stable, i. e., increasing modestly, if at all (McCall, pers. comm. 1995). Here, a network of trails (which are extensions of a larger network outside the watershed, mostly on Starker Forest Products land) has been well established for years. The motorcyclists' use of the same routes over the years has lead to soil compaction and erosion problems which may continue to grow if not addressed. There is also increasing use of the watershed by mountain bikers who revel in blazing new trails. Because of this propensity to avoid the "beaten path," mountain biking has not yet caused significant erosion problems.

The age class of trees (10-70 years old) in this zone provides good habitat and forage for elk and deer, so hunting is a significant activity in the fall; it may even improve as private landowners harvest their 60^{+} year-old stands and replace them with younger trees which are better forage. Fishing for anadromous fish (steelhead and coho) occurs here since much of the little spawning habitat left in the watershed is concentrated in this zone.

Camping in this zone is dispersed, and while there is no data about this activity, it is probable that outside of hunting camps, camping is at a very low level. Similarly, the use of this zone by horse riders is unknown, but it is thought to be low. Potential conflicts with users of the OHV trails will likely limit this zone's desirability for equestrian activities.

6 [1] BLM's Salem District RMP; USFS's Forest Plan; Benton County's Comprehensive Parks Plan; the city of Corvallis's Master Trails Plan; McDonald Forest's Trail Plan; SCORP; and the Green Belt Land Trust's (a nonprofit organization) Mary's River Trail Plan.

Rugged Zone

Trends, Concerns and Limitations

Because of its proximity to Mary’s Peak and its topography, this zone contains most of the recreation attractions, existing or planned, in the N. F. Alsea watershed. Current trail use levels in the Mary's Peak Recreation Area are perhaps 10,000 hiker visits annually on 10 miles of trail, and use is growing. The addition of new high-value loop-trails would, it is estimated, increase use to 20,000 multiple-use (mountain bikers, hikers) visits annually; equestrian use would be precluded because the USFS has in place a prohibition on livestock within the scenic botanical special interest area (above 3,000 ft. elevation). The Corvallis-to-the-Sea Trail (CTS) might conceivably increase trail use to as many as 30,000 visits annually. The increase in the number of recreationists is driven primarily by population growth in the Willamette Valley, especially in Corvallis/Philomath, so the demand for hiking trails and other recreation facilities will probably continue to increase even in the absence of active promotion of these activities (McCall, pers. comm. 1995).

The CTS would be routed through both the Rugged and Upper Basin Zones, on occasion crossing privately-owned lands on public road rights-of-way. Completion of this trail would require the cooperation of several private landowners, and given current funding cutbacks at all levels of the public sector and the lack of consensus on the desirability of the trail to begin with, there is little likelihood of the CTS being developed in this watershed any time in the next 3-5 years. However, a consensus for a “community vision” for it has yet to be reached. If completed, the CTS would be second only to the recreational developments on Mary’s Peak in its significance within the watershed.

Efforts to develop the CTS have varied in intensity over the years, and currently, the project is in a period of relative quietude. For example, according to the Forest Service’s Ken McCall (Pers. comm. 1995), “nothing is likely to occur within the next two, three or four years” with respect to the USFS’s portions of the trail because of a lack of funds. (The same is true for the parts of the Circumpeak Trail on USFS land.) On the other hand, Jerry Davis of Benton County’s planning department, reports that planning efforts continue on the part of the county to develop those portions of the CTS which will connect the county fairgrounds with existing trails on Mary’s Peak. (Pers. comm. 1995)

The numerous falls on the streams in this zone limit fishing above the falls to the resident cutthroat trout, and fishing pressure is relatively light because of the small size of the fish. There is some limited amount of anadromous fish habitat below the various falls, and sport fishing, especially for steelhead trout, is concentrated in these reaches. Although the ODFW does plan to open up an additional 2-3 miles of the N. F. Alsea to steelhead above the Alsea Hatchery, angling on this stretch will probably be prohibited or highly restricted until the steelhead appear to be well established. Hunting for elk, deer and bear, on the other hand, has been more intensive due to the relatively favorable mix of forage and cover.

There is a significant amount of camping in this zone associated with hunting, and some of the camps, particularly at the end of spur roads, are quite large. All of the other camping in this zone is dispersed and at a low intensity as there are no developed campgrounds in the watershed. Equestrian usage is low and likely to remain so because of the steep terrain and the USFS’s prohibition on livestock above the 3,000 ft. elevation in the scenic botanical special interest area. The terrain similarly inhibits OHV activity in this zone, although mountain bikers are beginning to ride roads, trails and off-road in the accessible portions.

Upper Basin Zone

Trends, Concerns and Limitations

A portion of the proposed Corvallis-to-the-Sea Trail would cross the middle of this zone; see the discussion in the Rugged Zone section. There is some dispersed camping around Klickitat Lake, and campsites are scattered at the ends of spur roads during hunting season. Hunting in the Upper Basin is fairly popular due to the variety of habitat types, fairly easy access and relatively gentle terrain. Fishing is common in the lake, but the small size of the resident cutthroat trout in the streams, along with the lack of anadromous fish runs (because of the falls in the Rugged Zone), does not attract anglers in numbers.

Equestrian usage is low because this zone is relatively remote from the primary access (Hwy. 34), there are few trails, and the landscape is relatively uninteresting. There is also little OHV activity in this zone, although mountain bikers are becoming more common on roads, trails and off-road in the accessible portions.

Objectives All Zones

Provide a wide range of developed and dispersed recreation opportunities, particularly campgrounds and trails, that contribute to meeting projected recreational demand within the watershed. Where feasible, tie new trails to existing ones both in- and outside the watershed's boundaries.

Manage scenic, natural, and cultural resources to enhance visitor recreation experiences and satisfy public land users consistent with other BLM management objectives and without impacting negatively the resources valued by private landowners.

Manage off-highway vehicle use on BLM-administered lands to protect natural resources, promote visitor safety, and minimize conflicts among various users

Maintain linkages for communication, planning and implementation with individuals, organizations and agencies that are stakeholders in recreational activities and developments in the N. F. Alsea watershed.

Obtain sufficient information (e. g., road conditions and locations, visitor use) upon which well considered decisions can be made.

Aquatic and Terrestrial Domains

Introduction

The existing conditions of the aquatic and terrestrial domains, as well as the processes affecting those conditions, have been dramatically altered as a result of the human processes that now dominate the ecosystem within the North Fork Alsea River Watershed. Natural processes affecting the aquatic and terrestrial domains operate more or less uniformly over the entire watershed. However, this analysis also recognizes that within this watershed four zones of influence are apparent which reflect a convergence of human processes with geomorphology and natural ecosystem processes (refer to Chapter 1). It is best to discuss interpretations of some of the issues in this analysis across the entire watershed, while for other issues, the interpretations of trends and their implications are best presented by zones of influence.

Objectives for Recovery and Enhancement

This analysis has pointed to many components and processes of the Aquatic and Terrestrial domains that are in need of recovery and enhancement. The overall objective of recovery and enhancement efforts is not to restore the watershed to reference conditions, but rather to restore ecosystem function by integrating both human and natural processes in such a way as to approximate or mimic reference conditions. Objectives for recovery and enhancement are presented for zones of influence.

Aquatic Domain

Fisheries

Anadromous species, particularly coho and steelhead, will continue to rely on those stream reaches, adjacent to the mainstem Alsea, where habitat conditions are adequate. The trend for habitat conditions is maintenance of the status quo with some improvement over the long-term in reaches where channel and riparian systems are allowed to recover. Without active intervention, habitat conditions in channels on private lands will likely remain degraded. On public lands, active intervention will be required to improve habitat conditions in the short-term but implementation of the Forest Plan should eventually result in improved conditions over the long-term.

Hydrology

As vegetative succession occurs and early seral stands grow to mid-seral stages, there will be a reduction of the magnitude of peak flows which have been influenced (i.e., increased) by timber harvest. In general, as forest stands reach about 40 years in age, the effects of clearcuts on peak flows are probably reduced. However, the rates of recovery vary depending on site quality and species composition. Watersheds with a high proportion of mid-seral stage stands on private lands (i.e., Early Logging Zone) are likely to be subject to harvest in the next ten years. Alteration of the quantity and timing of peak flows (assuming recovery from earlier harvesting has occurred) can be anticipated in these watersheds.

The effects of roads on peak flows are more permanent. In the N. F. Alsea watershed, roads have increased stream densities approximately 15%, increasing the efficiency of routing water into stream channels. Reductions in the effects of roads on peak flows will occur only when roads are decommissioned, and natural subsurface routing of water is resumed. Although the trend is for a reduction of road densities on BLM land, the influence of lower BLM road densities on peak flows is likely to be limited due to the density of private roads in the watershed.

The influence of compacted surfaces (associated with tractor logging on clearcut units) on peak- flows was not analyzed for this watershed. Nevertheless, older harvest technologies probably resulted in a significant degree of compacted surfaces, many of which recover extremely slowly. These areas will continue to influence the timing and intensity of peak flow events for several decades.

As opposed to peak flow, baseflow is assumed to have been reduced as timber harvest removed old-growth forests (late seral) from riparian areas, and these stands were replaced by alder and other deciduous species. Recovery will be slow as these stands age and conifer re-establishes.

Summer baseflows are also likely to have been reduced because of the reduction of in-channel and flood plain detention storage, a result of channel scour, entrenchment, and flood plain abandonment in low-gradient reaches. Introductions of large wood and restoration of the natural processes of large wood recruitment will result in localized aggradation of channel sediments and reconnection of flood plains on some reaches. On other entrenched reaches, the current streambed elevations and locations represent essentially permanent changes in channel morphology. In many locations, former flood plains will remain separated from the stream channels and flood plain interactions will remain disrupted so that baseflows will approximate current conditions.

Stream Channels

Many stream channels have been destabilized by excess sediment inputs, removal of large instream wood, and disturbances to stream banks and to the flood plain/riparian zones. Some channels have been diverted and riparian areas compacted. Many low-gradient reaches are entrenched and unstable, and exhibit bank cutting. The trend is slow recovery with continued channel adjustments on BLM lands while on private lands (assuming no attempts to restore channels), the trend is for no significant change from the status quo.

Sediment delivery and routing, particularly for small to medium particle sizes (i.e., gravels and cobbles), may be moving in the direction of limited supply. Aggradation of channels has not been observed although bedrock channels devoid of larger size substrates are not uncommon. Some streams appear to transport large *fine* sediment loads which appear to be depositing in low-gradient reaches. Bank cutting due to channel adjustments may be the primary source of these fine sediments. Roads and trails also contribute fine sediments, but how much is unknown. The current rate of fine sediment transport is likely to be maintained.

Stream banks destabilized by riparian timber harvest and heavy equipment operations in the channels will continue to recover as riparian areas regenerate and re-establish deep, dense root masses on the banks. However, stream banks on entrenched reaches with adjusting channels will continue to erode.

Recovery of pool frequency and depth, sediment storage capacity, and flood energy dissipation requires higher levels of large woody debris (LWD) than currently exist; GIS analysis shows low potential for LWD recruitment on approximately 50% of the watershed's streams. Maintenance of the status quo is probable except on reaches where active intervention is implemented to enhance in-stream and riparian conditions.

Channel stability in low-gradient reaches ("response" reaches) will recover slowly as LWD supply increases and channel adjustment (in response to the alterations in LWD supply, flow regime, and sediment supply) abates. Stream channels that are entrenched and laterally unstable will remain unstable and disconnected from the flood plain unless there is active intervention.

Water Quality

Water quality in the watershed is poorly documented so the following trends are highly speculative.

Elevated stream temperatures as a result of inadequate shading should be declining as riparian stands are allowed to recover on public land. This will be offset to some degree wherever private landholders harvest second-growth stands and open some stream channels to direct sunlight.

Where stream temperatures are high due to poor channel conditions (i. e., low-gradient, entrenched reaches with wide, shallow flows in the summer), temperatures will remain high unless there is active intervention to restore the channel.

Fine sediment and turbidity levels will likely decrease in streams on BLM lands as ground disturbing activities are limited in riparian zones and unstable areas. On the other hand, fine sediment supply will likely increase on private lands as thinning and harvesting of second-growth stands, with increased road construction and use, increases. In addition, there will continue to be heavy fine sediment loads and high turbidity in streams where channel adjustments are continuing.

Riparian Areas

Most of the riparian areas which were clearcut and have poor LWD recruitment potential are hardwood-dominated stands about 50 years or more in age. It will be many years before these areas re-establish the conifers required to supply LWD to stream channels and riparian areas. In some cases (e. g., high water tables), hardwoods are naturally dominant. Mixed stands of hardwood/conifer, with western red cedar the dominant conifer, are the site potential in riparian areas along many low-gradient reaches. In all likelihood, some red alder dominant stands will convert to brushy, salmonberry-dominated sites if there is no management intervention. The trend on BLM lands is for low LWD recruitment for the next 40-100 years with slow increases as riparian stands age. The trend on private lands, assuming implementation of the current Forest Practices Act, is for an even slower recovery with significantly lower overall recruitment potential.

On BLM lands, steeper gradient reaches with predominately second-growth plantation stock will eventually recover as stands are allowed to mature into later seral stages. This is a long-term process: recruitment potential from these areas will remain low for the next 40 - 100 years. On private lands, these reaches are likely to be harvested on a rotational basis with little opportunity for the development of older forest types. The trend here is for continued poor LWD recruitment potential.

Zones of Influence

Early Logging Zone

Trends, Limitations and Concerns

This is the most critical zone for recovery and maintenance of anadromous fisheries in the N. F. Alsea watershed. In particular, usable habitat for coho is almost exclusively limited to a few miles of low gradient stream in this zone. The convergence of high cumulative effects, high value fisheries habitat for a species that will likely be listed, and the increased focus on this zone for timber management on both private and public during the next ten years should be a red flag for management. The BLM may be managing the only remaining stream habitat in the N.F. Alsea that is adequate for the maintenance of coho. We need to pay close attention to our management in this zone (as well as the equivalent zone in the South Fork Alsea) with particular emphasis upon anadromous fisheries.

Objectives

This zone has the highest priority for watershed restoration projects where the objective is to protect or restore fish habitat and water quality (road maintenance and/or closure, culvert replacements etc.) Focus fish habitat and stream channel maintenance and recovery efforts in this zone.

Rugged Zone

Trends, Concerns and Limitations

Throughout this zone, most habitat will be utilized by resident cutthroat trout whose population trend is stable. There is expected to be continued low utilization of the habitat by anadromous fish because they are restricted to the lower reaches of this zone. The ODFW project to modify the North Fork Alsea Fish Hatchery diversion dam will allow anadromous fish access to approximately 2-3 miles of potential spawning habitat, upstream between the hatchery and the first waterfall.

This zone has the highest potential for increases in peakflows as a result of forest management activities, particularly road construction. The effects of roads on peakflows will likely be permanent. Roads have resulted in substantially increased stream densities in this area, increasing the efficiency of routing water into stream channels. This affect is compounded because of high precipitation and TSZ in this area. Reductions of effects of roads on peakflows will occur only when roads are decommissioned, and natural subsurface routing of water is resumed. The trend here is for no change from the status quo.

Parker Creek appears to have the best channel conditions within this zone. Slide Creek, Yew Creek, Alder Creek, and western tributaries to the Crooked Creek Frontal are highly disturbed. The trend on BLM land is for recovery of channel and riparian function while private lands will likely maintain the status quo.

Objectives

Focus fish habitat and stream channel maintenance and recovery efforts on the reach of stream that will become available to anadromous fish following the ODFW project (section 19 of T.13 S. R.8 W.). Maintain good channel and riparian conditions in Parker Creek and along the Lower North Fork Alsea mainstem

Valley Zone

Trends, Limitations and Concerns

Spring and fall chinook will continue to utilize the lower mainstem despite continued poor water quality (heavy fine sediment load, high summer stream temperatures).

Habitat conditions are unlikely to improve without active intervention in the channel (which would carry a high risk and cost). Potential for habitat improvement in the mainstem is low until channel stability and function are recovered.

Reductions in summer baseflows have likely been due to reductions in channel and flood plain detention storage as a result of channel scour and flood plain abandonment in low-gradient reaches. On entrenched reaches, the current streambed elevations and locations represent a relatively permanent change in channel morphology. Former flood plains will remain separated from the stream channels and flood plain interactions will remain disrupted, and baseflows will approximate current conditions.

Low-gradient reaches on private lands are entrenched, bank cutting, and unstable. The trend is extremely slow recovery with continued channel adjustments.

The mainstem Alsea River will continue to transport large sediment loads, especially fines (silts and clays), which appear to be depositing in low-gradient reaches during baseflow. Bank cutting due to channel adjustments is probably the primary source, with upstream contributions a secondary source.

Increases in stream temperature as a result of inadequate shading should continue since riparian stands adjacent to the mainstem are not recovering. Where stream temperatures are high due to poor channel conditions (I. e., low-gradient, entrenched reaches with wide, shallow flows in the summer), temperatures will remain high indefinitely. This prospect pertains to most of the private agricultural lands adjacent to the lower North Fork Alsea mainstem.

There will continue to be heavy fine sediment loads and high turbidity in streams where channel adjustments are continuing. Sediment supply in the mainstem may increase due to increased harvest and road use in the adjacent Early Logging Zone.

The threat of bacterial contamination from livestock, dispersed recreation and sewage systems will increase with public use.

Most of the riparian zones adjacent to agricultural fields contain narrow bands of remnant stands of mixed hardwood/conifer, and have poor LWD recruitment potential. It will be many years, if ever, before these areas re-establish the conifers necessary to supply LWD directly to stream channels and riparian areas.

Objectives

Inventory all low gradient, unconfined reaches on BLM. Pursue channel enhancement work where potential for anadromous habitat is high, particularly in tributaries to the lower mainstem of the North Fork. Maintain good riparian shading to protect cool water sources.

Upper Basin

Trends, Concerns and Limitations

There should be continued stable habitat and water quality in this zone, with utilization of the streams primarily by resident cutthroat trout.

Due to the moderate topography and elevation, the risk of alterations of flow regime is lowest in this zone. Therefore, the trend is for continuation of the status quo.

Stream channels are likely to be mostly stable although some low-gradient reaches on private lands appear to be entrenched and bank-cutting. The trend is for slow recovery on these reaches with continued channel adjustments. Sediment loads are unknown but likely to be within the range of reference variability. Channel stability in low-gradient reaches ("response" reaches) will recover slowly as LWD supply increases and channel adjustments (results of alterations in LWD supply, flow regime, and sediment supply) occur. Stream channels that are entrenched, especially on private land, will remain disconnected from the flood plain and riparian zone indefinitely.

The increased buffer widths and buffering of higher order streams (due to recent changes in the forest management objectives that were applied in this zone) have mitigated somewhat the effects of riparian degradation on streams on public lands in this zone so moderate-to-good LWD recruitment potential should continue to be the norm. The trend is for low LWD recruitment on private lands for the short-term with slow increases as riparian stands age. This zone, overall, has maintained the highest LWD recruitment potential in the watershed.

Objectives

Inventory all low gradient, unconfined reaches on BLM. Maintain good riparian shading to protect cool water sources. Close any unnecessary roads.

TERRESTRIAL DOMAIN

Soils

Human processes which result in the disturbance or compaction of soil will impact not only the behavior of the affected soil, but also the habitat potential for plants and animals. Debris avalanches and rotational slumps are natural mass wasting processes that, under normal conditions, will cycle and replenish debris and gravel into the stream system. When the rate of these mass wasting events is accelerated by human activity (e.g., road building, logging), there can be dramatic impacts on stream channels and considerable portions of the riparian zone may be affected. Mass wasting is the most prominent geomorphic process affecting streams within this watershed. Roads which lack surface runoff control have accelerated landslide events in medium and high risk landslide areas. On 9,000 acres of high risk potential areas, between 1950 and 1993 there were eight slides in forested areas and 48 road-related slides; most of these slides occurred between 1950 and 1966, a period of higher than normal precipitation. The majority of this landslide activity has occurred within the Rugged Zone. Studies from other areas indicate a high relationship between peak precipitation and road failures. Since the 1970s road standards have improved, and with the road network largely completed, road related failures are expected to decline on public lands. By applying improved road standards and by eliminating chronic road failure areas, watershed stabilization should be improved.

Dry-raveling on steep convex hillslopes is a natural mechanical process that is usually in balance with soil development. Vegetative cover, especially trees, stabilizes annual and daily temperature variations, and this tends to moderate the process. Any activity that removes vegetation or disturbs surface soils, such as logging and fire, will accelerate dry-raveling rates. Dry-raveling begins on convex slopes >60%, and rates are highest on slopes >80%. Many of these slopes are slow to revegetate and remain poorly stocked for many years after disturbance. The TPCC survey has identified land where dry-raveling rates are unacceptable if disturbed and areas where light disturbance is allowed. Presently, exposed sites are not feasible to treat since such efforts could likely result in further disturbance of the site.

Soil compaction and disturbance create impacts to soil qualities that further influence vegetative density, vigor and diversity. Alder dominated habitats are common on soils that have been disturbed or compacted, and are usually located on concave slopes, benches and/or rolling topography. Soil compaction increases the potential for surface erosion by reducing infiltration. Soil compaction and disturbance were minor occurrences in the watershed before human activity. This activity was greatest between 1930 to 1970 when the maximum use of ground-based logging equipment was used to remove timber on more moderate hillslopes. Much of the soil compaction occurred in the higher producing soils on flatter ground in the Early Logging and Rugged zones. Studies indicate as much as 24% of the soil within the watershed may be compacted from the use of ground-based equipment. In such areas, tree growth reduction of 30% to 50% may occur. Since the 1970s, the use of designated skid trails and mitigation of compacted soils has been required on public lands. Currently, mitigation of compacted soils by subsoiling is included in all timber sale plans where such treatment is feasible. Compacted soils that have already revegetated are usually not feasible to treat.

Runoff and erosion from compacted soils occurs during high intensity rainfall events. When sediment from compacted areas is in close proximity to roads or streams, this runoff can become an acute problem. It is also important to note that OHV and motorcycle use is increasing in the watershed and extensive trail use during rainy periods contributes sediments to streams where trails and streams intersect. To reduce sedimentation, trails must avoid crossing streams or be constructed with sediment traps.

Fire and Vegetation

Processes related to fire and vegetation have changed dramatically in the past 150 years of Euro-American settlement in this watershed. Across the entire watershed, trends related to fire and vegetation are readily apparent. These general trends are a result of the reduction or elimination of some ecological processes, and the replacement of others with human processes.

The role of fire processes within this watershed has been dramatically altered. Large-scale fire events of the past (see Reference Conditions) have been replaced with small prescribed burns of harvest units following logging operations. The mixed ownership pattern, the value of the standing timber resource, and the increasing human presence dictate the need to prevent large-scale wildfires. In the future, wildfires will continue to be aggressively suppressed and minimized to the extent possible. Thus, natural wildfires which produced large uniform patterns and left diverse structural features in their wake (e.g., residual live trees, standing snags, and down logs), have been replaced by timber harvest and prescribed burns that affect smaller patches, occur at a faster pace, and leave fewer intact structural features.

Processes of *ecological succession* have also been altered by human activities which have greatly affected the pattern of vegetation. In a general sense, vegetation growth rates and transition between seral stages have remained the same, yet manual planting of seedling stock has largely replaced natural reseeding, and density management of younger aged stands has hastened seral stage transition. Whereas, the grass/forb communities which developed after large scale disturbance events of the past may have persisted for several years or decades, the current reforestation efforts greatly reduce the time line of grass/forb communities, often to less than five years. Initial composition of regenerated stands is largely driven by a desire for high quality timber, although some natural reseeding of tree species does occur. Species composition is further refined in subsequent stand treatments which collectively result in a faster transition of the early forest seral stages, more uniform species composition, and more simplified stand structure. While the earliest seral stages persist for a shorter duration than they did in the past, the current need to provide a yearly flow of timber results in a steady overturn of at least a few forested stands, thereby creating new patches of grass/forb vegetation annually. The various successional pathways that create forested stands are now truncated after several decades rather than a few centuries, as most private land managers follow rotation schedules of 40 to 60 years and federal land management has generally followed an 80-year rotation. The short rotation schedules and past wildfires have created skewed age-class distributions, in which grass/forb and shrub habitats are well represented, the early forest stages are abundant, and the oldest forests (stands established before the Yaquina Fire; over 130 years old) in this watershed have nearly been liquidated. Thus, the current human-affected processes produce a pattern of smaller forest patches, constricted seral stage duration, manipulated species composition, simplified stand structure, and skewed age-class distributions favoring the earliest seral stages.

Human-affected processes have certainly moved the current conditions of vegetation well away from those represented by the Reference Conditions. The extent to which these altered processes have impacted nutrient cycling or long-term sustain ability within this ecosystem is unknown. However, some obvious changes can be seen in plant and animal distributions and populations related to the simplified forest structure (i.e., lack of snags) and reduced older seral forest habitat. By greatly reducing the present rate of harvest and ground disturbance on federal lands, the recent implementation of the Northwest Forest Plan has begun to mitigate some of the detrimental trends of the recent past.

Special Botanical Areas

In contrast to the broad trends affecting gross acreages of Douglas-fir forest stages, there are also some specific plant communities that are a cause for concern. For instance, the unique plant communities associated with the Special Botanical Areas are at risk of losing both their floral and faunal diversity as forest encroachment and noxious weed invasion has diminished the plant communities in these areas. The removal of fire and increased human activity (recreational use, adjacent ground disturbance) are primarily responsible for altering the natural processes that maintain these communities.

Also, hardwood forests associated with riparian areas often represent unique ecological site factors (e.g. saturated soils, variable seasonal water tables) where a diversity of shrub and herbaceous vegetation can be found. Some of these areas are wetland habitats that are of special importance to both aquatic and terrestrial wildlife species.

Wildlife Habitat and Species

This analysis of the human and natural processes affecting future trends in wildlife habitat is based on three very important assumptions: (1) implementation of the Northwest Forest Plan will proceed on federal lands, (2), no appreciable changes will occur in the management of non-federal lands, and (3) changes in the relative abundance of seral stages will be followed by parallel changes in wildlife populations that utilize the habitats represented by the seral stages. The trends in habitat are well described by the zones of influence presented below. However, some prominent trends and concerns for wildlife habitat apply across the entire watershed. The age distribution of forests on BLM lands is expected to shift to late-successional forest slowly as a result of current forest management plans (NFP, RMP) which require establishment of LSR and Riparian Reserves. However, continued logging on private lands will slightly dampen this effect across the watershed. Thus, the trends in forest age-classes reflect a balancing of projected harvesting on private lands with forest protection on BLM-administered lands. Currently, 29% of the federal lands within this watershed are in LS/OG condition. Ingrowth over the next decade will add about 900 acres to the LS/OG stands, and over the next 50 years the amount of LS/OG on federal lands will more than double (then representing more than 50% of the federal owner-ship). Yet, over the next several decades no appreciable increase is expected in the total amount of classic old-growth habitat (>200 years old) within this watershed. In fact, due the rarity of these stands and their vulnerability to factors such as windthrow and disease, there may be some loss of existing old-growth patches in the near-term (i.e., next 50 years).

The structural features of forest stands (snags, down wood, sub-canopy layers) are expected to improve across the entire watershed as a result of forest ingrowth, and regulatory directions on both private and federal lands which call for increasing such components in harvest units. Special habitat features are expected to remain similar to current conditions over the near-term, with the exception of dry meadow habitats (particularly those at higher elevations) which are expected to decline due to natural succession and control of fire. Total road density within the watershed will likely increase as private forest managers re-open old roads or create new roads in large acreages of young forest that will reach harvest age in the next decade. Current management direction for roads on BLM lands calls for reducing road densities primarily by blocking unused roads. The potential to close roads on BLM lands will likely outweigh the potential increase of new roads on private lands; thus, road densities are expected to shift across the watershed toward private holdings.

In trying to synthesize the current habitat trends, it is difficult to determine with much certainty whether the available habitats are (or will be) adequate to support all wildlife species of concern in the watershed. At the regional level, implementation of the NFP is expected to provide for the needs of most of the federally listed wildlife species. Within the N. F. Alsea watershed, however, several factors have been identified that contribute to an increased risk for loss of wildlife diversity:

1. Very small total acreage of old-growth habitat; the highly fragmented condition of these remaining patches increases their vulnerability to fire, insects, and disease

2. Low levels of snags and down wood, especially on older harvest units

3. Lack of knowledge about the amount and condition of special habitats

4. Current high road density, with total road density likely to remain high

There are also at least two factors which serve to reduce the risk to wildlife diversity:

1. The current low rate of habitat modification, compared to the recent past, due to the greatly reduced harvest levels on federal lands

2. Large, young forest blocks in the watershed provide connectivity corridors with older forest blocks that lie just outside of the watershed (i.e., older forests in the Corvallis Watershed to the northeast, and the Grass Mountain/Lone Spring Mountain areas to the west). Thus, dispersal corridors that link to source populations of highly mobile older-forest associates (like the northern spotted owl) still exist.

The population trend for bald eagle, black bear, and Roosevelt elk cannot simply be related to expected increases in late-seral forest habitat, since habitats other than late-seral forests are required to meet the needs of these species. Bald eagles in western Oregon are most often associated with large bodies of water (e.g., large rivers, lakes, reservoirs and estuaries) which provide stable food sources, especially fish. To the extent that anadromous fish runs recover, the wintering population of bald eagles within this watershed will be benefitted. Early seral habitats (e.g., clearcuts, meadows, young plantations) are important foraging habitats for black bear and elk, and these habitats are expected to shift across the landscape away from LSR lands and onto private holdings. Black bear populations may increase as recent state-wide hunting restrictions are likely to reduce the harvest pressure on the population. The damage caused by bears on young plantations is also likely shift more toward private lands. The elk population is currently on the increase. As available forage habitat shifts away from LSR lands and onto private lands, the potential for damage to young stands and agricultural lands will increase. The forage quality of recent clearcuts on both federal and private lands, will continue to decline, as plantations become established on the cutover areas.

A sharp rise in the amount of forage habitat may be a few years off. Thus, the low levels of forage habitat that will be available in the interim may result in increased damage complaints on private lands. Harassment and hunting pressure may mitigate the damage done by big game. But, efforts toward cooperative management by BLM, USFS, ODFW, and private landowners will ultimately determine the trend in both bear and elk populations within this watershed.

There is very little or, in some cases, no information to adequately assess the current distribution and trends for the northwestern pond turtle, northern goshawk, harlequin duck, Pacific fisher, and all the invertebrates. These species may be limited by factors in addition to the availability of suitable habitat. For instance, the pond turtle and fisher may be limited by demographic factors (e.g., poor recruitment, isolated populations, very low population density) which preclude their ability to respond effectively to local increases in available habitat.

Species of Concern

Some general trends, with respect to individual species of concern are likely to result from the projected changes in seral stages. The populations of the following species are expected to increase as habitat in LSR and Riparian Reserves recovers toward late-successional forest conditions: red-legged frog, tailed frog, southern torrent salamander, northern spotted owl, marbled murrelet, red tree vole, white-footed vole, and all bat species.

Zones of Influence

Early Logging Zone.

Trends, Concerns and Limitations

Most, if not all, of this zone escaped the Yaquina Fire, and probably was composed of large patches of late-successional and old-growth forests when it was logged in the early part of this century. This area lies near the edge of the Willamette Valley foothills and probably experienced a more frequent fire regime due to seasonal burning by the Kalapuyans. Ridge lines and the drier south slopes likely experienced under burnings that probably produced a diverse forest structure of multi-storied stands, lower stocking densities, and large dominant Douglas-fir old-growth. This area lies along the divide between the coastal stream basins and the Willamette Valley Basin, and likely functioned as a key north-to-south dispersal corridor for old-growth associated species following the Yaquina Fire.

As noted in Chapter 3 (Reference Conditions), early logging efforts in this Zone tended to treat large patches of forest in which remnant patches of old-growth, cull trees, and large amounts of snags and coarse woody debris were left behind. As a result, this north-to-south dispersal corridor was interrupted by an east-to-west corridor of early seral habitat. The extensive harvest patches disrupted the use of this area by older forest associated species, while simultaneously facilitating dispersal of early-seral associates from the Willamette Valley into the interior of the Coast Range. Subsequent recovery and ingrowth of the forests in this area has occurred until recent decades when the second round of harvest activity began with newer technologies, affecting smaller patches.

Currently, much of this zone is still composed of contiguous dense young forest stands (45 to 60 years old). Forest remnants and coarse woody debris that survived early logging are now greatly reduced, due to natural attrition and salvage logging efforts in the 1960s. The old snags and coarse woody debris are in advanced stages of decay, while smaller diameter hard snags and down wood are now beginning to accumulate as many of these stands are transitioning through the stem exclusion phase. The tiny remnant patches of old-growth are declining, yet these patches still represent examples of the oldest forest within this watershed (some individual trees approach 400 years old). These old-growth patches, many of which are located on the steeper topography and in riparian areas, may still provide refuge to some older forest associated species of plants and animals. Most of the old-growth associated species requiring larger forest patches, such as the marbled murrelet, were likely extirpated from this area following railroad logging. The ingrowth of the younger forest patches has yet to cover the crowns of the remnant old-growth trees, so nesting opportunities for murrelets may continue to be quite limited for a few more decades. Over the past decade, the large, young forest patches have again come to be used as a north-to-south dispersal corridor for species like the spotted owl, while providing very little forage habitat for species like elk. High use of OHVs and relatively recent re-introductions of elk in the vicinity (transplants in 1979 into the S. F. Alsea watershed) may also be limiting expansion of elk into this area.

The trends for habitat conditions in the near-term are dependent on harvest practices of both BLM and private lands. In the next decade harvest activity will likely involve large patch density management on BLM lands as well as a few small regeneration harvest patches. Private lands are likely to be commercially thinned and clearcut in larger patches as most of the forest stands are now at (or soon to approach) harvest age. Related to this harvest activity, road densities will increase as old roads are re-opened and new roads are needed to facilitate newer logging technologies. Deer and elk populations will expand into this area as new forage opportunities arise. The current dispersal corridor for spotted owls will become more fragmented. However, the retention of Riparian Reserves on federal lands should still maintain an adequate dispersal corridor (about 50% of zone should meet “ 11 - 40” conditions) for the next two decades.

Valley Zone.

Trends, Concerns and Limitations

This zone probably experienced the most frequent fire regime in the N. F. Alsea watershed, since native people followed by the early settlers often made use of seasonal burning. These fires kept the valley in meadow habitat or oak savannas, and maintained open conifer stands and oak/madrone forests along the upper margins of the valley. The dry and wet meadows of the valley bottoms provided high quality forage for deer and elk. The valley zone was the focus of early settlement in the mid 1800s where initial homesteading and logging efforts quickly removed older conifer forest patches and eliminated most of the conifers from riparian forest corridors.

Currently, very few old-growth conifers remain in this zone, and the riparian forests are now dominated by maple and alder. Oak savannas and oak/madrone woodlands have been greatly reduced; in the absence of fire, Douglas-fir has invaded and now dominates many hardwood stands previously devoid of conifers. Settlement, development, and agricultural use has virtually eliminated native meadow habitats and replaced these habitats with annual croplands, pastures, and forb-lands. The plant and animal species dependent on the native grassland habitats have largely been displaced out of this zone, or shifted to marginal habitats within the valley. Localized damage complaints from elk, deer, and bear are increasing on agricultural lands and in young plantations along the valley margins.

The dominant human presence and in this zone will continue into the future. In the next decade damage complaints from big game animals are likely to continue to rise as early seral forage habitats in other zones transition to older seral habitats. Wildlife species associated with older forest conditions, were probably never abundant in this zone. Some of the residual patches of late-successional forest along the margins of the valley may be important to the small transient population of bald eagles that follows anadromous fish spawning in the late fall and winter.

Valley and Early Logging Zone

<u>Objectives</u>

Ensure vegetation recovery on disturbed sites such that infiltration and percolation process are restored to natural levels.

Protect soil conditions on steep hillslopes and contain loose materials near the source of dry-raveling sites.

Ensure that invasive non-native plants do not proliferate to threaten existing native plant communities

Manage vegetation as established in the ROD for the Northwest Forest Plan. The Riparian Reserves and Matrix lands in these zones should exhibits the full range ecological succession with both natural and managed disturbance processes.

Retain residual old-growth trees and snags to the fullest extent possible to unsure that associated elements of plant and animal diversity are conserved within this zone.

Maintain the north-to-south connectivity of midseral forests through this zone to provide a dispersal corridor for spotted owls.

Explore cooperative management opportunities that benefit elk habitat while lessening damage complaints on private lands.

Rugged Zone

<u>Trends, Concerns and Limitations</u>

This zone displays the greatest diversity in both fire and vegetation patterns. The western edge of this zone was consumed in the Yaquina Fire but the eastern edge was not. Following this fire, the vegetation in this zone consisted of large patches of early seral habitat with a prominent component of coarse woody material in the west and an intact contiguous patch of late-successional forest in the east. Along a north-south line in the middle of this zone, the fire left feathered edges and fingers of forest habitat forming a transition from the early seral habitat of the west to the older forest patches of the east. Additional late-successional forest was burned during the Alsea Mountain Fire in 1930. Salvage logging that followed that fire removed fire-killed trees and some green patches, primarily on the south and west slopes of Old Blue Mountain.

Current forest conditions also reflect a contrast from west to east. In the decades following the Alsea Mountain Fire, timber harvest was first focused on salvage logging followed by clearcut harvesting on both private and federal lands in the central and eastern portions of this zone.

Few old-growth patches exist among the large tracts of young conifer forest that occupy the eastern portion of this zone, and the snag and coarse woody debris component of the second-growth stands is very decadent (similar to the railroad logging zone). Recent harvest activity (past few decades) on the steeper topography of the western portion of this zone has created numerous open patches in the mid- to late-seral forests (70 to 120 years old) that regenerated following the large fires. Currently, the western portion of this zone has a large cluster of late-seral interior forest patches which collectively form a key dispersal corridor linking older forest habitat from the south and west of Grass Mountain with similar habitat on the east slopes of Mary's Peak. The majority of the occupied marbled murrelet habitat and the only consistently occupied spotted owl site occurs in the western portion of the rugged zone within this older forest corridor.

Over the next few decades, little ingrowth is expected in the condition of interior forest patches. The few older forest patches remaining on private lands will likely be harvested. All of the federal lands in this zone are allocated as LSR, so no loss of the existing late-seral stands is expected from these lands. The corridor of interior forest patches should remain largely intact, although there is concern for loss of a few parcels on private. Thus, the quality and availability of habitat for species associated with older forests will decline slightly (next decade) before improving (beyond 50 years). Forage conditions for deer and elk will gradually decline as early seral habitat on private and federal lands grows out of optimal forage condition. This trend may be somewhat offset by harvest activities on private.

Upper Basin

Trends, Concerns and Limitations

This zone was consumed by the Yaquina Fire, which produced a pattern of large homogenous patches of regenerating conifer forest. Homesteading and logging activities occurred later in this zone than in the others, in part because early settlers found large saw timber more abundant in the other zones while it was essentially non-existent in this zone. The large contiguous forest patches reached harvest age during the 1950s and later, and were not extensively harvested until the late 1960s to the present. Better road building standards and newer harvest technologies (i.e., skyline logging) produced smaller patch sizes, but left less snags and down wood on harvest units.

Currently, most of the industrial forest lands in this zone have been harvested and are now in early seral stages less than 30 years old. Conifer stands that regenerated after the Yaquina Fire are now in the 110- to 130-year age-class, and are restricted almost entirely to small fragmented patches on BLM lands. There is no classic old-growth (>200 years old) in this zone, so habitat for species associated with older-forests is quite limited. No spotted owl sites are known in this zone even though much of it has been thoroughly surveyed. Abundant early seral stages have created excellent forage habitat for deer and elk. Deer populations have responded quite well to these conditions while elk herds appear more localized to areas with less human activity.

The few small patches of late-seral forest remaining on private lands will likely be harvested in the next decade, and no appreciable ingrowth of late-seral habitat is expected on BLM lands until 50 years or more. Thus, significant improvement in the condition of late-successional forests will be several decades away. Big game populations will likely remain stable in this zone over the next decade, thereafter forage conditions will decline on BLM lands.

Upper Basin and Rugged Zone

Objectives

Ensure vegetation recovery on disturbed sites such that infiltration and percolation process are restored to natural levels.

Protect soil conditions on steep hillslopes and contain loose materials near the source of dry-ravelling sites.

Ensure that invasive non-native plants do not proliferate to threaten existing native plant communities

Manage vegetation as established in the ROD for the Northwest Forest Plan. The LSR and Riparian Reserves in these zones should exhibit the full range of natural disturbances (i.e., animal damage, fire, landslides, insect outbreaks, windthrow, disease) and ecological functions associated with late-successional forests.

Manage the Grass Mountain and Mary’s Peak ACECs to protect the unique ecosystems and processes represented by the grass balds and high elevation true fir forests in these areas.

Maintain and enhance the west-to-east connectivity of late-successional forests patches across this zone to provide both dispersal and nesting habitat for older-forest associated species.

Explore cooperative management opportunities that benefit elk habitat by lessening the harassment and poaching vulnerability in this zone.

Chapter VI - Recommendations

Introduction

The preceding five chapters serve as a foundation and rationale leading to the present chapter: Recommendations. These recommendations should be considered in light of the data available for this watershed; which varies both qualitatively and quantitatively. Perhaps more than any chapter, this chapter reflects a consensus of the analysis team's findings concerning the future management of BLM land in the North Fork Alsea River Watershed. For the most part, areas of contentiousness have been resolved, but some recommendations may be found which are at variance with each other. These will require management decisions to determine which are to have precedence.

Priorities have been assigned to each of the recommendations by the specialists who have the most expertise related to them. It is well recognized that these priorities will be affected by considerations of budget, which in turn is a function of political realities. However, recommendations and their priorities have been made without consideration of whether there will be sufficient (or any) funding to implement them. While the recommendations may state or imply that the processes will take years, if not decades, to achieve the desired result(s), this document itself is understood to have a much more limited "shelf life." In other words, it is, realistically, written to impact perhaps the next five to ten years of land management in the watershed; beyond that time-frame, more or better science and analysis, combined with political change, may well alter most or all of what was recommended here. However the developers of the watershed analysis recognized this by noting that it is an iterative process: change is expected, if not desirable.

Human Domain

<u>COMMODITY FOREST PRODUCTS</u>

All Zones

Finding: Matrix

Considerable acreage on, matrix lands, has stands which are overstocked and of ages normally associated with commercial thinning. Thinning overstocked stands may improve aquatic and terrestrial habitat, and at the same time, produce forest products. The Early Logging Zone has the greatest amount of potential commercial thinning acreage, but at the same time, this zone has received considerable negative impacts from past logging practices.

Recommendations

<u>High Priority</u>

The following activities are linked sequentially:

1) Initiate an aggressive program of stand examination on areas which appear to be suitable for commercial thinning

2) Where stand exams indicate, commercial thinning should be conducted in the watershed. Light touch logging methods should be practiced in order not to degrade the watershed further in areas which have been heavily impacted by past logging practices.

Finding: Late Successional Reserve (LSR)

The N. F. Alsea watershed contains considerable LSR designated lands, primarily in the Upper Basin and Rugged Zones, where density management may be desirable for fish and wildlife objectives. The Rugged Zone has been identified as an area with high landslide potential, any management activity in this zone should consider low impact operational plans.

Recommendation

<u>Medium Priority</u>

The following activities are linked sequentially:

1) Conduct stand exams on LSR areas which show potential for density management.

2) Do density management on areas where benefit to fish and wildlife will be most beneficial.

Finding: **Riparian Reserve**

Opportunities exist for density management in the Riparian Reserves throughout the LSR and Matrix. The Aquatic section of this chapter recommends that vegetation manipulation within appropriate reaches of streams would be desirable for the recruitment of future LWD.

Recommendation

<u>High Priority</u>

Work with the Fisheries program, coordinating compatible reaches of streams and forest stands where density management activities would most benefit Aquatic objectives.

Finding: Roads

Road decommissioning is recommended in both the terrestrial and aquatic portions of this chapter as a method for habitat improvement. As evidenced by the recent Ernest Creek (1996) timber sale, some timber sale contracts can be an effective means for accomplishing this work since the contractor typically already has the appropriate equipment on-site for performance of other work.

Recommendation

<u>High Priority</u>

Wherever practical and in conformance with Transportation Management Objectives, use timber sale contracts as a tool for implementing road decommissioning.

Finding: Regeneration Harvest

Analysis indicates that approximately 167 acres are currently available for regeneration harvest in matrix outside Riparian Reserves (see Chapter 4). The 167 acres that are available have stand ages of 60+ years. The acreage that is available for harvest is not over mature and is still putting on good growth.

Recommendation

Medium Priority

The five year sale planning team should evaluate these 167 acres for possible inclusion in the plan. (Note: from purely a timber management perspective, this acreage is not a high priority for cutting.)

Special Forest Products

Findings: All Zones

Little is known about SFP species viability, distribution or ecological life cycles. Increased interest and high demand from the public will require management action due to the high profile that will be associated with SFPs.

Recommendations:

Medium Priority

Establish a inventory program for SFPs. Collect data on ecological life cycles, population distribution and sale locations. Monitor inventory data with sales so as not to over harvest certain areas.

Maintain a SFPs program that will accommodate public demand.

Transportation

Findings: 1996 Flood Damage

The precipitation year starting in 1995 was particularly wet. In February, 1996, a 25-50 year runoff event occurred (the worst event since the 1964 flood). Significant runoff occurred, triggering numerous land-slide events, resulting road and culvert damage. An incomplete inventory of the transportation system in the N. F. Alsea reveals that immediate corrective action should be under taken to mitigate resource damage and salvage capital investments.

Recommendations:

High Priority

High priority projects for each Zone of Influence have been identified by an double asterisk (**) in Appendix 6, " Potential Road and Culvert Projects."

With consideration given to current staffing and budgetary constraints, initiate and complete as many of these identified project as soon as possible.

Findings: Road Inventory/Transportation Management Objectives

An interdisciplinary (ID) team of specialists reviewed data generated by a field reconnaissance inventory of all BLM-controlled roads in this watershed, and identified the road use restrictions and priority uses of each road. Using results from this ongoing process, the Salem District is currently establishing the Transportation Management Objectives (TMO) for the North Fork Alsea River Watershed.

A major information gap is lack of road and culvert data and information on approximately 119 miles of private controlled roads within the watershed analysis area.

Recommendation

High Priority

Finish the TMO in order to enable the BLM to manage the transportation system more effectively.

Findings: Transportation Management Plan

Once completed, the TMO process will result in the development of maintenance levels, determination of road closure statuses, and design of maintenance and/or improvement criteria.

Recommendation

High Priority

A watershed-wide "Transportation Management Plan" should be developed after the ID team has finalized all TMOs for the BLM-controlled roads. This plan should, at a minimum:

1) identify inspection and maintenance needs during and after storm events;
2) identify road operation and maintenance priorities with emphasis on correcting drainage problems that contribute to degrading riparian resources; and
3) provide criteria for regulating traffic during wet periods to prevent damage to riparian resources.

Although the TMO process has not yet been completed, a *partial* list of project opportunities (for BLM roads only) has already been derived from the road inventory; specific project recommendations are listed in the Appendix 6, Potential Road and Culvert Projects.

The list of projects in Appendix 6 was generated based upon their having met one or more of the objectives which appear in the list which follows. Projects which will come on-line after the completion of those listed in are also expected to fulfill one or more of these objectives as well.

Potential Road and Culvert Project Objectives

Improve Stream Crossings on Unsurfaced Roads: This will reduce the risk of sediments entering stream courses, especially when vehicular or OHV use occurs during wet weather. Measures to reduce sedimentation at these areas include surfacing the crossing area, vegetating cut and fill slopes, controlling wet weather access and improving drainage.

Replace Severely Damaged or Deteriorated Culverts: To avoid culvert failure and the subsequent deposition of sediments into streams.

Monitor and Maintain Stream Diversion Potential Culverts: These culverts have the potential to divert water out of the natural stream channels and form alternate channels should the culverts become plugged or fail.

Monitor and Maintain or Replace Partially Blocked Culverts: Culverts blocked by debris, rocks, and or sediment can cause significant damage to the road and/or the stream.

Prioritize and Replace Potentially Undersized Culverts: These culverts may not be large enough to meet present standards for major flood events and should be considered for improvement or replacement. These culverts have been field identified by engineers but require a drainage analysis before replacement.

Close or Decommission BLM Roads Posing a Threat to Wildlife, Fisheries or Other Resources. Closure may be accomplished with gates, earth berms, or other physical barriers. Decommissioned roads may include various types of road surface treatments (i.e., scarifying, waterbars), culvert or fill removal, and/or reducing the height of fills. Some roadbeds may be converted to recreational trails.

Repair Roadside Failures: Such failures may be due to slides, unraveling cut slopes, or eroded fill slopes.

Surface Dirt Roads: Roads having grades greater than 8 percent would be surfaced with rock to reduce potential for surface erosion and runoff into streams.

Recreation

Finding: Campgrounds and Trails (Currently proposed)

There is a growing demand for developed campgrounds and trails for hiking, horseback riding and mountain biking due primarily to growth in population centers such as Corvallis/Philomath and elsewhere in the mid-Willamette Valley. Existing trails on BLM land (there are no developed campgrounds) are beginning to exhibit evidence of overuse, and user satisfaction is probably beginning to lessen.

Recommendations

Several trails and campgrounds have been identified in the Salem District's RMP, have been tentatively laid out on the ground, and should be developed. See Appendix 6, Roads-To-Trails Recommendations, for road segments that have exclusive perpetual easements which include access rights for the public and could be converted to trail use.

High priority

Circumpeak Trail: 5-mile long loop trail
Parker Ridge Trail: 6-mile long loop trail

Medium priority

North Fork Alsea River Trail: 8-mile long loop trail
Parker Creek Recreation Site: 16 equestrian fee sites, and a primitive camp with overnight accommodations

Low priority

North Fork Alsea River: dispersed primitive camping area with toilet(s)

Finding: OHV and Motorcycle Use

OHV and motorcycle use has been occurring, particularly in the southeast portion of the watershed, in a more or less unplanned and unregulated manner for more than 30 years. Erosion and other environmental problems exist, and user and landowner conflicts have occurred. A sequence of activities is required to address these problems.

Recommendations

High priority

1. Establish a consensus among OHV enthusiasts and private and government landowners for a use and trail plan which best meets the needs of each stakeholder.

2. Develop an OHV plan which includes a long-term implementation strategy for the trails and other facilities.

3. Enhance the Greasy Creek/Gleason Creek Motorcycle Area.

4. Use BLM recreation staff, BLM law enforcement officers, Benton County Sheriff, Starker Forests, and/or Oregon State Police to ensure compliance with the relevant OHV and other regulations.

Finding: New Trails and Campgrounds

The watershed can support more trails and campgrounds than now exist or have been proposed. Projected demand and use may eventually result in the need to develop additional trails and campgrounds.

Recommendations

Low priority

1. Conduct an inventory of potential road to trail conversions, and identify the routes for new trails (including sites for bridges), and the locations for new campgrounds.

2. Conduct the required planning processes.

3. Implement projects as resources permit.

Finding: Corvallis-to-the-Sea Trail (CTS) and Mary's Peak

There continues to be a significant body of support for development of the CTS and attendant recreational facilities on and around Mary's Peak.

Recommendations

<u>Medium priority</u>

1. Continue participating in the process of achieving a consensus for the CTS and Mary's Peak among the stakeholders.

2. If a consensus is achieved, modify existing plans where necessary to meet any concerns expressed.

3. Develop the Racks Creek Primitive Campground and/or the CTS. The latter would require designating the appropriate forest road(s) for road-to-trail conversions. (see Appendix 6, "Roads-To-Trails Recommendations")

Finding: Land Acquisition

Numerous adjustments in land tenure are available in the N.F. Alsea. Many of these adjustments would benefit recreation while some are also suggested as opportunities for enhanced fisheries habitat (see Aquatic Domain this Chapter).

Recommendations

<u>Priority: Moderate</u>

Land Tenure Adjustment Suggestions:

Township: 13S	Range: 8W	Section: 24	N. F. Alsea River
13S	8W	12	N. F. Alsea River
13S	8W	2	" "
13S	8W	3	" "
13S	7W	19	" "
13S	7W	20	" "

Aquatic Domain

<u>Fisheries and Stream Channels</u>

Finding: Information Needs

Site specific information on the current dynamics of anadromous fish populations in the N.F. Alsea as well as the condition of potential habitat on BLM streams is inadequate.

Recommendations

<u>High Priority</u>

1) All high "potential" stream reaches (i.e., "productive flats": low gradient, unconfined streams) should be field inventoried to ascertain the current condition of the stream channel and flood plain, and their utilization, potential and limiting factors as anadromous fish habitat.

2) Management actions to restore and/or maintain anadromous fish habitat and populations in these reaches should be identified and prioritized.

Finding: Habitat Enhancement Projects

Populations of wild, anadromous fish, particularly coho salmon, appear to be in decline relative to reference condition. Poor habitat conditions on BLM lands in the N. F. Alsea may be contributing factor in this decline.

Recommendations

<u>High Priority</u>

Projects to enhance stream channel function and anadromous fish habitat, particularly in reaches utilized by coho, should be pursued in those places where an adequate site investigation has identified a need and an acceptable benefit/cost ratio. First priority for such projects are the so-called "productive flats" associated with low gradient reaches in the Early Logging Zone.

A special effort should be made in the Early Logging Zone to coordinate with private landholders to identify and implement fish habitat enhancement and channel restoration projects.

Due to the high costs and risks inherent in stream channel or fish habitat enhancement projects, these projects should be jointly planned and implemented by a team that includes a fisheries biologist, an engineer, and a hydrologist.

The ROD for these projects should specify an appropriate pre- and post treatment effectiveness monitoring program and the project should be peer reviewed.

Channel and fish habitat restoration projects on BLM-managed streams need to adequately consider conditions on the adjacent private lands, as well as those down and upstream from the project, and the risks to project success these imply.

Finding: Road Improvement Projects

Populations of wild, anadromous fish, particularly coho salmon, appear to be in decline relative to reference condition. Fine sediment from road surfaces which deposits in pools and spawning gravels may be a contributing factor in this decline.

Recommendation

High Priority

Projects to reduce the production and delivery of fine sediments from road and trail surfaces to stream channels should be pursued. First priority for such projects are roads and trails in the Early Logging Zone which contains the majority of the remaining coho habitat in the NF Alsea.

Inventory and monitoring of road and trail surfaces for sediment production and delivery to streams coupled with monitoring of fine sediment deposition in low gradient reaches of stream channels should be pursued in the Railroad Logging Zone.

Finding: Beaver Populations

Recovery and stabilization of beaver populations activities in stream channels were identified by the ODFW Alsea Basin Plan as critical to recovery of coho salmon habitat.

Recommendation

High Priority

1) All high "potential" stream reaches (i.e., "productive flats:" low gradient, unconfined streams)should be field inventoried to ascertain the current condition of the stream channel and flood plain, and their utilization, potential and limiting factors as beaver habitat.

2) Management actions to restore and/or maintain beaver populations in these reaches should be identified and prioritized.

Finding: Land Acquisition

An opportunity exists to acquire and manage high potential anadromous fish habitat in the NF Alsea. Privately owned land (Starker Forest Products, Inc.) along the North Fork Alsea River above the Alsea Hatchery encompasses approximately 1.5 miles of the mainstem of the North Fork as well as several tributaries which will become accessible to anadromous fish, particularly steelhead trout, when ODFW removes the existing barrier at its hatchery.

Recommendation

High Priority

Acquire this land by land exchange. This acquisition would allow the BLM to manage both the riparian zone as well as in-channel structure and features to enhance the spawning and rearing habitat for these fish. Such work would be done in accordance with ODFW's "Alsea River Basin Fish Management Plan" (1995).

Water Quality

Finding: Information Needs

Site specific information regarding water quality , water temperature and sediment sampling on BLM streams in the NF Alsea is inadequate.

Recommendation

<u>High Priority</u>

Continue stream temperature trend monitoring on anadromous streams focusing on reaches that were identified as having a high "risk" for temperature increases and couple this with measurements of dissolved oxygen.

<u>Moderate Priority</u>

Continue pre-treatment monitoring (above and below) on Crooked Creek (section 11) and other areas where riparian enhancement work is a strong possibility.

<u>High Priority</u>

Continue to explore "grab sample" turbidity monitoring with sediment source searches during storm events in the winter.

Test and implement various channel sediment sampling methodologies such as pebble counts. These methods are fairly inexpensive and can be done during summer base flow to help determine the extent and trend for fine sediment deposition in spawning gravels and pools.

<u>Moderate Priority</u>

Establish and maintain a set of aquatic invertebrate sampling locations in appropriate streams.

Finding: Motorcycle Trails and Water Quality

These trails are of special concern primarily because so little known about their condition and many are potential sources of fine sediment delivery to streams.

Recommendation

<u>High Priority</u>

Meet with the Flat Mountain Riders to discuss water quality concerns. A short presentation of the Ernest Creek project proposal (which includes the closure of some motorcycle trail along Ernest Creek) and an explanation of the Aquatic Conservation Strategy priorities under the new ROD is recommended.

2) Elicit the clubs cooperation to complete an inventory of the trails (at least on BLM lands). This inventory should, at a minimum, provide enough information to make site specific recommendations for trail maintenance and closure.

3) Road 13-7-11 is heavily used by ORVs and is an obvious direct sediment source to an anadromous stream. This road should be decommissioned and blocked.

Hydrology

Finding: Roads in the Rugged Zone

The "rugged" zone in the North Fork Alsea (Parker Creek, Yew Creek, portions of Crooked Creek, and Easter Creek) is at high risk for cumulative watershed effects due to high road density.

Recommendation

<u>High Priority</u>

Evaluate all roads in the Rugged Zone for decommissioning utilizing the following priorities:

A) Roads on high risk landslide terrain coupled with high rainfall and located in the TSZ.
B) Roads in riparian zones or with close proximity to streams.
C) Roads that efficiently capture and route surface runoff to streams.

Finding: Information Needs

Site-specific information on the current flow regimes on BLM streams is inadequate.

Recommendation

<u>High Priority</u>

Inventory all known stream flow gaging sites in the vicinity of our lands. Use these to establish "bankful flow" conditions in the watershed and extrapolate to ungaged sites.

Establish a network of streamflow discharge estimation sites... ideally linked to stream reference sites and sediment monitoring sites.

Finding: Transient Snow Zone and Peak Flows in the Rugged Zone

The combination of TSZ, high precipitation and high road densities may have altered peak flow events in the Rugged Zone resulting in high risk of cumulative effects.

Recommendation

<u>High Priority</u>

Work with the District Hydrologist to utilize our flow modeling capabilities to investigate the potential for interacting variables (roads, TSZ, high precipitation, forest harvest, etc.) to have increased peak flow timing and intensity in the Rugged Zone. This may be particularly critical to channel conditions in the lower North Fork Alsea mainstem with implications for anadromous fisheries and will help us improve our ability to predict cumulative effects.

Riparian Reserves

Finding: Adjustments of Interim Riparian Reserve Widths

The intensity of site specific information required for an evaluation and adjustment of riparian reserve widths in the N.F. Alsea and the appropriate protocols for conducting such an evaluation are not currently available. Protocols are being developed.

Recommendation

<u>High Priority</u>

1. Interim riparian widths in the forest plan should be retained for all stream types in the North Fork Alsea.

2. The area manager should recommend to district management that an interdisciplinary team be appointed to research and recommend appropriate actions to be taken by the Salem District on this critical issue.

<u>Moderate Priority</u>

Riparian reserve widths on intermittent streams should be re-evaluated in a second iteration of WSA following the dissemination and approval of appropriate protocols.

Finding: Vegetation in Riparian Reserves

The vegetation in riparian reserves appears to be dominated by early seral stage stands of conifer and/or hardwood/conifer mix. Older seral stage stands are under-represented relative to reference condition resulting in poor potential for recruitment of LWD for the forest floor and stream channels and reductions in habitat for species adapted to these conditions. Nevertheless, site-specific inventory/evaluations have not been conducted for the majority of riparian reserve acres on BLM. A series of actions is recommended.

Recommendation

<u>High Priority</u>

1) All riparian stands adjacent to high “potential” stream reaches (i.e., low gradient and fish bearing) should be field inventoried to ascertain the age, size class and distribution of dominant species. Appropriate hydrologic, biotic, and recreational features should also be inventoried.

2) An interdisciplinary team should be appointed to evaluate these areas and produce a site specific plan for their management. The objective of the plan would be to promote the attainment of the Aquatic Conservation Strategy and to maintain and restore critical anadromous fish habitat in these reaches.

3) The opportunity to promote the growth of conifer in riparian zones dominated by red alder appears high on Crooked Creek (T13S 8W Sec 11), and Honeygrove Creek (T14S, R.7W, Sec 3). Both areas are adjacent to anadromous fish streams and should be evaluated by appropriate specialists.

4) Opportunities to increase LWD recruitment potential in all riparian reserve areas should be pursued. This may involve thinning in second growth conifer stands, "release" of young conifer beneath stands dominated by deciduous species, particularly red alder, or the reestablishment of conifer in areas that historically supported them but are currently depleted. These projects should focus on the zone within one site potential tree of the stream and/or on terraces and hillslopes immediately adjacent to the stream's active floodplain. A complement of species and age classes should be promoted which best reflects the natural vegetative potential of the site. Where possible, "reference sites" should be used as a model.

Finding: Late Seral Stage Forest in Riparian Reserves

Late seral stage riparian forest is fragmented, rare and one of the district's most valuable resources.

Recommendation

<u>High Priority</u>

All late seral stage riparian stands should be identified and field inventoried to ascertain the age, size class and distribution of dominant species and other relevant biological and physical features. These stands should be recognized for their unique value as habitat and to provide models for understanding riparian processes under unmanaged conditions.

Finding: Trails and Roads in Riparian Reserves

Approximately 25% of total road miles and several miles of motorcycle trail are located within riparian reserves. These surfaces contribute to water quality degradation, altered hydrologic response, and degraded habitat conditions for plants and wildlife.

Recommendation

<u>High Priority</u>

1) All roads and trails within reserves should be evaluated for closure/decommissioning and maintenance needs.

2) New roads or trails in reserves should be avoided and the consideration of alternatives to construction in reserves is highly recommended. Any new road or trail construction must ensure compliance with the Aquatic Conservation Strategy objectives.

3) Existing roads and trails which cross streams should be evaluated for risk to aquatic resources. Where risks are high, management actions to reduce these risks should be taken. These actions may include

replacement or redesign of inadequate stream crossing structures; resurfacing and reshaping of the road surface to improve drainage and reduce sediment delivery; decommissioning of the road and rerouting to avoid the stream crossing; and, closures to reduce road use during critical periods.

4) Do not construct any additional roads or trails which cross streams.

Terrestrial Domain

Implementation of the standards and guidelines required by the Northwest Forest Plan and the Salem District RMP will generally improve the condition of terrestrial ecosystem on federal lands within this watershed. In addition to general standards and guidelines that have been outlined in the planning documents mentioned above, several opportunities and recommendations specific to this watershed are mentioned below.

Soils

Since future federal management actions are expected to follow standards and guidelines (S&G) and best management practices (BMPs) described in current planning documents, the risk of creating new soil problem areas is considered a minimal. To ensure that soil problems are minimized, future management actions must be followed with effective monitoring efforts. Recommendations for soil protection and enhancement should be focused on existing problem areas as outlined below:

Finding: **Landslides**

Many existing roads and harvest actions on federal lands show an increased incidence of debris avalanches and slumps. These localized landslide events have affected the productivity of soil resources in some areas (also see road-related opportunities in the Human Domain). Efforts previously undertaken to fix road problems may not have entirely fixed landslide scars.

Recommendations:

<u>High priority</u>

Develop a plan for removal of unneeded roads on federal lands throughout the watershed

Inventory all landslide scars for feasibility of treatment.

Finding: **Compaction**

Some past management actions on federal lands have resulted in localized areas of soil compaction, where soil productivity has been degraded.

Recommendations:

<u>High priority</u>

Initiate efforts to identify compaction areas that are limiting soil productivity, and consider subsoiling compacted soil areas that are not at least minimally vegetated.

Finding: **Productivity**

Localized areas with poor soil productivity may be limiting the some regenerating forest plantations on federal lands.

<u>Low priority</u>

Assess areas where soil nutrients may be limiting vegetation productivity. These areas are usually localized on steep hillslopes or broad ridgetops above 1800 feet. It may be appropriate to apply fertilizers to reduce nutrient stress in these areas.

Some of past harvest units may be lacking soil surface organic matter, and consideration should be given to adding logging residue to portions of these areas to help mitigate the low organic matter levels.

Fire and Vegetation

In addition to the standards and guidelines outlined in the ROD, there are specific opportunities that may benefit the diverse vegetation within this watershed.

Finding: **Prescribed Fire**

Fire has historically been the primary disturbance factor responsible for producing large landscape patterns and diverse forest stand structures. Removal of the natural patterns and processes created by fire has affected the spatial patterns and stand structures of our managed stands. It is therefore appropriate to consider the use of prescribed fire to achieve a variety of vegetation conditions that are deemed important to the functioning of the terrestrial ecosystem. In addition to the traditional use of prescribed burns for site preparation and hazard reduction following harvest actions, it is also important to consider the use of fire in the following areas:

Recommendations:

Medium priority

Investigate the use of fire in creating or enhancing snag and down log components of mid-seral stands in LSRs. Use of fire in some areas could be coordinated with planned silvicultural treatments designed toward hastening the development of late-successional forest conditions. It may even be appropriate to explore the use of fire as a single tool in creation of these conditions.

Investigate the use of fire in modifying or enhancing understory vegetation composition to benefit forage conditions for big game. This strategy could be employed in young and mid-seral forest stands within elk emphasis areas that have been identified in the wildlife section below.

A prescribed fire research plan could be developed to learn more about control of brushy and/or competing non-native plant species on the grassy balds within the watershed. For instance, in small, selected areas on Grass Mountain and Mary's Peak it could be beneficial to use fire to control encroaching and competing vegetation.

The BLM management plan for the Grass Mountain RNA/ACEC will be revised within the next 1-2 years, and the suitability of fire as a management tool in this area should be addressed.

Finding: **Noxious Weeds**

The distribution and abundance of non-native and competing vegetation threatens the integrity of some unique plant communities within the watershed.

Recommendations:

High priority

Use genetically local native plant materials in the revegetation of disturbed areas, especially in and adjacent to wetlands and other special habitats. If these materials are not available, use revegetation methods that do not encourage the introduction or spread of invasive non-native plant species.

Finding: **Plant Association Groups**

The current lack of planning tools to addresses impacts to plant communities and plant species of concern, constrains our effectiveness at implementing Survey and Management guidelines of the Northwest Forest Plan.

Recommendations:

High priority

Develop a GIS layer for plant association types at the watershed level. At the provincial level of planning, this has been proposed as a major need in FY 96 through 98. However, the scale of this effort may not be adequate at the watershed level. The BLM should help fund efforts to produce this layer at the Provincial level; upon its completion assess the suitability of this layer at the watershed level. If the Provincial layer is not adequate, develop a site specific theme for the watershed. This information will enable us to make better predictions on future stand compositions and conditions as well as addressing potential management problems and opportunities.

Initiate surveys for SEIS special attention plant species; record and store locations in a database with a developed GIS layer.

Wildlife Habitat and Species

The Interagency LSR Assessment (USDA-SNF, USDI 1996) presents selection criteria for identifying stand conditions that are most amenable to manipulation and for prioritizing stand treatments based on wildlife resource needs. These LSR Assessment guidelines are generally applicable to the North Fork Alsea watershed. It is important to remember that a strict focus on conducting enhancement projects designed to achieve future landscape level objectives for habitat, may result in unnecessary short-term impacts to species within the watershed.

For instance, density management of young stands adjacent to unsurveyed late-successional forest patches may benefit future forest conditions, but could incur significant incidental take to marbled murrelets or spotted owls in the short-term. Therefore, opportunities that further the long-term objectives of wildlife habitat must be evaluated in light of potential short-term and site-specific impacts to wildlife species within this watershed.

Finding: **Structural Diversity**

Past management activities have diminished the structural diversity of forested stands within the watershed.

Recommendations:

Medium priority

Commercial thinnings on Matrix lands and density management on LSR lands should include measures to increase coarse woody debris (CWD) levels, such as topping or felling some selected trees that meet or exceed average stand diameters. An adequate inventory of CWD should be conducted on all project areas identified for thinning.

Regeneration harvests on Matrix lands should recognize that a legacy of remnant old-growth trees and large snags may be present in proposed units. All opportunities to retain and protect small patches around these features should be pursued. At a minimum it is expected that these features will be retained individually as leave trees and snags, except where safety concerns require felling.

Density management projects on LSR lands should recognize the natural successional pathway of the environment and strive to mimic vegetative and structural diversity.

Finding: **Forest Fragmentation**

Late-successional and old-growth forests represent only 17.8% of the watershed, and past harvest patterns have left most of theses stands in a highly fragmented condition.

Recommendations:

High priority

An effort should be made to pursue land-exchange opportunities in the corridor between Mary's Peak and Grass Mountain (Rugged Zone). Blocking up federal ownership in this corridor offers the most immediate and substantial benefit in the watershed to maintaining and enhancing the condition of late-successional forests by connecting two large areas of late-successional forests.

Blocking and decommissioning of roads will benefit the functioning of the terrestrial ecosystem. From the viewpoint of wildlife habitat, priority should be given to LSR and Riparian Reserves over Matrix lands. Within the Rugged and Upper Basin zones there are several opportunities for reducing open road miles which will immediately benefit late-successional forest conditions and will also benefit elk herds in the area.

<u>High priority</u>

Density management opportunities in LSR should be focused at hastening the development of late-successional forest conditions in the Upper Basin Zone and Rugged Zone. Hastening the development of mid-seral habitat around the existing patches of older forest will lessen the edge contrast, afford better wind protection, and contribute to better interior forest conditions in this highly fragmented area. It may be appropriate to forego thinning opportunities in the 40- to 70-year age classes at higher elevations in the Rugged Zone, since most of these stands are adjacent to patches of late-successional forest, many stands are already are showing adequate levels of species diversity and subcanopy development, and all of these stands currently function as dispersal habitat for spotted owls.

Finding: **Unique and Special Habitats**

The current lack of information on unique and special habitats within the watershed places the existing wildlife and plant diversity at risk, and constrains our effectiveness at implementing new forest management plans.

Recommendations:

<u>High priority</u>

The unique habitats and associated invertebrate species on Mary's Peak would benefit significantly from a comprehensive field inventory and literature review. This information would meet the requirements of Survey and Management guidelines, further the intent of the Endangered Species Act, and provide an excellent baseline for assessing the impacts posed by the expected increase in recreational use of this area.

Special consideration should be given to initiating an inventory and field review process of special habitat features within this watershed. This information should be developed into a GIS layer to aid in project-level planning.

Finding: **Species of Concern**

Lack of knowledge concerning wildlife species of concern places some of these species at risk, and constrains our effectiveness at implementing Survey and Management guidelines in the Northwest Forest Plan.

Recommendations:

<u>High priority</u>

Survey remaining old-growth patches for the presence of marbled murrelets. In addition to project level surveys needed for consultation purposes, surveys of the best available habitat (Rugged Zone) as well as the remnant old-growth patches (Railroad Zone) will provide a much needed picture of current murrelet distribution within the upper Alsea River Basin.

Medium priority

Initiate, or assist in, species assessments at different spatial scales. Interagency efforts to inventory species and assess viability at the River Basin or Province scale will greatly enhance our understanding of many Special Attention Species (SAS). An interagency assessment to model wildlife relationships at the provincial level (Habscape analysis) has been initiated and should be supported by BLM. The risk associated with decreasing the interim widths of Riparian Reserves will be better understood as SAS information and habitat conditions are addressed at these larger scales. Also, management of species that may be limited to unique habitats (e.g., Roth's blind beetle, Prairie Peak blind beetle) will be better served by addressing regional distribution questions in a cooperative process.

Survey the extensive young forest stands in the Railroad Zone for the presence of northern goshawks. The stand conditions in this zone closely resemble the forest stands where two goshawks nests were found in western Lane County (10 miles to the South) in 1995.

Finding: **Big Game**

Management objectives for elk populations established by the Oregon Dept. of Fish and Game call for increasing the herd sizes within this watershed. Meanwhile private and agricultural lands have experienced significant damage from this species.

Recommendations:

High priority

Initiate partnerships with ODFW and local landowners to benefit elk populations on federal lands and reduce damage complaints on private. Two areas of immediate interest are:

(1) Honeygrove/Seeley Creek vicinity. This area has a growing elk herd, significant damage on adjacent private lands, good potential for controlling access on BLM, and an abundance of young conifer stands that could be manipulated to provide better under story forage conditions.

(2) Easter Ridge vicinity. Elk in this area may be vulnerable to harassment. This area is designated as LSR, and access is controlled by BLM at a few key points.

These two areas as well as other areas in this watershed should be evaluated in the near future in order to address the immediate need for damage relief, and to help ODFW attain management goals for elk within the Alsea Management Unit.

APPENDIX 1 = 3 pages, 3 maps: 1) locator/ownership goes here

APPENDIX 1 = map 2) “zones of influence” goes here

APPENDIX 1 = map 3) LUAs goes here

APPENDIX 2 = 1 page, map of fish habitat goes here

APPENDIX 3 TABLE 1

Alsea River Chinook Catch in Pounds by Months

1923-1949

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total[1]
1923	----	----	----	----	----	25,706	----	----	2,901	3,015	603	----	32,225
1924	----	----	----	----	6,116	29,053	----	----	13,616	13,747	584	----	63,116
1925	----	----	----	----	7,381	18,651	11,000	----	12,222	16,438	2,782	20	68,494
1926	----	----	----	----	1,158	8,651	8,012	----	2090	6,527	1,481	94	28,013
1927	----	----	----	----	198	11,928	18,787	----	4,918	4,014	499	----	40,404
1928	60	----	----	----	403	9,385	13,032	----	1,551	3,247	2,500	27	31,571
1929	----	1,426	----	----	1,119	10,912	7,686	----	4,616	4,893	167	----	36,317
1930	----	6,924	----	----	2,362	6,587	4,037	----	3,142	6,488	168	----	24,945
1931	----	2,161	----	----	----	2,407	5,149	----	4,183	5,139	54	----	19,066
1932	----	2,134	----	----	2,622	16,740	21,115	132	3,979	5,872	1,035	----	54,076
1933	----	2,581	----	----	3,742	18,859	52,665	1,728	6,454	10,829	2,222	52	97,530
1934	979	----	----	----	12,440	23,425	52,769	29,101	6,160	8,780	374	93	137,304
1935	4,162	----	----	----	1,681	10,808	32,691	27,954	8,802	7,359	1,049	176	92,255
1936	1,735	----	----	----	1,358	7,933	32,839	27,771	17,679	20,191	4,143	----	112,211
1937	297	----	----	----	33	3,128	12,632	12,001	8,139	25,231	1,032	----	62,261
1938	65	----	----	----	382	4,819	11,033	18,103	10,329	7,031	1,270	111	53,256
1939	178	----	----	----	1,347	4,697	13,420	19,476	14,194	10,415	579	----	64,156
1940	28	----	----	----	756	4,761	15,804	27,590	11,793	6,956	340	399	68,870
1941	471	----	----	----	805	6,558	15,576	21,329	12,844	13,238	640	795	71,985
1942	200	----	----	----	172	256	8,010	13,400	14,654	18,436	9,907	----	65,078
1943	243	----	----	----	----	274	2,290	7,351	16,332	9,823	359	----	38,015
1944	1,586	----	----	----	----	----	561	1,848	10,142	5,013	704	----	18,268
1945	----	----	----	----	----	----	634	1,243	10,089	8,317	2,131	----	22,414
1946	----	----	----	----	----	----	16	735	9,506	10,683	293	----	21,233
1947	----	----	----	----	----	----	430	6,719	16,653	15,193	505	----	39,500
1948	----	----	----	----	----	----	----	----	29,750	12,121	624	----	42,495
1949	----	----	----	----	----	----	----	----	24,294	12,802	906	----	38,002

APPENDIX 3

Table 2

Alsea River Silver Catch in Pounds by Months

1923-1949

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total[1]
1923	----	----	----	----	----	----	----	----	13,519	84,277	109,851	6,835	215,773
1924	1,202	89	----	----	----	----	----	----	61,793	234,806	13,183	504	315,414
1925	128	----	----	----	----	----	----	----	17,537	50,737	86,505	7,890	162,822
1926	153	----	----	----	----	----	----	----	21,330	96,961	16,032	565	134,935
1927	47	----	----	----	----	----	----	----	29,202	70,444	17,792	353	117,818
1928	27	----	----	----	----	----	----	----	9,795	89,160	26,249	1,006	129,099
1929	96	2,793	----	----	----	----	----	----	19,747	127,979	15,321	19,662	192,753
1930	----	10,044	----	----	----	----	246[2]	----	16,997	60,584	24,702	1,119	111,751
1931	5,969	2,134	----	----	----	----	----	----	26,873	55,273	14,812	----	111,255
1932	510	13,787	----	----	----	----	6,829[2]	93	28,720	144,112	75,415	1,286	272,123
1933	484	15,184	----	----	----	----	----	----	61,103	150,587	17,602	4,961	239,589
1934	5,336	----	----	----	----	----	----	----	10,336	132,531	19,319	6,537	172,792
1935	4,069	----	----	----	----	----	23[2]	----	51,009	253,116	209,686	10,479	543,331
1936	19,018	----	----	----	----	----	----	----	27,112	191,352	58,824	19,185	299,640
1937	3,167	----	----	----	----	----	----	----	13,540	233,840	56,945	42	304,657
1938	290	----	----	----	----	----	----	----	43,509	272,855	90,815	532	408,530
1939	819	----	----	----	----	----	----	----	68,078	280,204	107,434	19,033	487,656
1940	12,907	----	----	----	----	----	----	----	75,362	158,777	10,025	7,427	252,211
1941	620	----	----	----	----	----	----	----	56,512	168,701	44,247	3,470	275,799
1942	2,869	----	----	----	----	----	----	----	39,062	66,838	19,132	58	125,615
1943	525	----	----	----	----	----	----	----	24,420	63,579	6,888	62	99,726
1944	2,777	----	----	----	----	----	----	----	95.638	271.877	49,480	1,320	419,622
1945	1,307	----	----	----	----	----	----	----	23,732	183,960	79,379	8,041	295,153
1946	41	----	----	----	----	----	----	----	33,341	113,108	14,369	----	160,818
1947	----	----	----	----	----	----	----	----	24,571	178,655	7,771	----	210,997
1948	----	----	----	----	----	----	----	----	19,725	110,256	33,755	----	163,736
1949	----	----	----	----	----	----	----	----	19,663	58,742	11,245	----	89,650

[1] Includes January, February of following year. [2] Probably ocean-caught troll fish.

APPENDIX 3 Table 3

Alsea River Steelhead Catch in Pounds by Months

1923-1949

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total[1]
1923	----	----	----	----	----	----	----	----	----	----	598	7,329	18,672
1924	9,489	1,056	200	----	----	----	----	----	----	----	215	10,567	23,702
1925	7,959	4,035	926	----	----	----	----	----	----	----	691	14,012	34,986
1926	17,079	2,698	506	----	----	----	----	----	----	----	1,043	19,522	33,351
1927	8,848	3,938	----	----	----	----	----	----	----	----	1,227	12,041	21,082
1928	5,868	1,946	----	----	----	----	----	----	----	299	3,978	20,385	31,917
1929	5,911	1,344	----	----	----	----	----	----	----	----	1,3891	14,989	25586
1930	5,988	3,220	----	----	----	----	----	----	----	1,245	7,912	21,374	41,319
1931	9,823	965	----	----	----	----	----	----	----	47	7,420	17,421	35,420
1932	5,393	5,1397	----	----	----	----	109	----	69	----	990	14,124	25,156
1933	6,785	3,079	----	----	----	----	----	----	----	----	12,379	27,668	46,853
1934	6,806	----	----	----	----	----	----	----	----	----	1,595	13,785	21,133
1935	5,753	----	----	----	----	----	----	----	----	502	----	17,504	34,655
1936	16,649	----	----	----	----	----	----	----	----	----	----	31,370	46,405
1937	15,035	----	----	----	----	----	----	----	----	----	----	1,751	4,877
1938	3,126	----	----	----	----	----	----	----	----	----	4,716	10,743	21,426
1939	5,967	----	----	----	----	----	----	----	----	----	----	14,410	20,246
1940	5836	----	----	----	----	----	24	----	----	----	7,927	22,290	38,747
1941	8,506	----	----	----	----	----	----	----	----	----	53	6,068	18,600
1942	12,479	----	----	----	----	----	----	----	----	----	1,939	14,502	25,458
1943	9,017	----	----	----	----	----	----	----	----	----	----	1,039	4,565
1944	3,526	----	----	----	----	----	----	----	----	----	3,178	14,574	26,102
1945	8,350	----	----	----	----	----	----	----	----	4	925	3,236	6,237
1946	2,072	----	----	----	----	----	----	----	----	----	2,6999	----	2,699
1947	----	----	----	----	----	----	----	----	----	----	312	----	312
1948	----	----	----	----	----	----	----	----	----	136	9,246	----	9,382
1949	----	----	----	----	----	----	----	----	----	87	109	----	196

TABLE 4

CASES, ESTIMATED POUNDS (ROUND) AND ESTIMATED NUMBERS OF COHO SALMON PACKED ON THE ALSEA RIVER, 1892-1922

YEAR	CASES	EST. POUNDS (THOUSANDS)	EST. NUMBER (THOUSANDS)
1892	3,600	245	23
1893	3,240	220	21
1894	4,160	283	27
1895	3,280	223	21
1896	3,400	231	22
1897	3,200	218	21
1898	2,170	148	14
1899	5,010	341	32
1900	---	---	---
1901	4,629	315	30
1902	4,530	308	29
1903	4,242	288	27
1904	6,500	442	42
1905	1,800	122	12
1906	3,843	261	25
1907	5,100	347	33
1908	6,000	408	39
1909	5,486	373	36
1910	5,900	401	38
1911	9,329	634	60
1912	8,286	563	54
1913	4,304	293	28
1914	6,728	458	44
1915	6,966	474	45
1916	3,864	263	25
1917	6,621	450	43
1918	7,215	491	47
1919	2,607	177	17
1920	982	67	6
1921	0	0	0
1922	0	0	0

TABLE 5

POUNDS (ROUND) AND ESTIMATED NUMBER OF COHO SALMON LANDED ON THE ALSEA RIVER, 1923-1956

YEAR	**POUNDS**	**EST. NUMBER (THOUSANDS)**
1923	215773	21
1924	315,414	30
1925	162,822	16
1926	134,935	13
1927	117,818	11
1928	129,099	12
1929	192,753	18
1930	111,751	11
1931	111,255	11
1932	272,123	26
1933	239,589	23
1934	172,792	16
1935	543,331	52
1936	299,640	29
1937	304,657	29
1938	408,530	39
1939	487,656	46
1940	252,211	24
1941	275,799	26
1942	125,615	12
1943	99,726	9
1944	419,622	40
1945	295,153	28
1946	160,818	15
1947	210,997	20
1948	163,736	16
1949	89,650	9
1950	103,647	10
1951	131,999	13
1952	134,521	13
1953	70,403	7
1954	76,974	7
1955	87,098	8
1956	95,337	9

APPENDIX 3

APPENDIX 3, map (fire history) goes here

APPENDIX 4: 6 maps: 1) current regen. opps. goes here

APPENDIX 4: map 2) future regen. opps. goes here

APPENDIX 4: map 3) cur. thin. opps. goes here

Appendix 4: map 4) " future comm. thin. opps." goes here

Appendix 4: map 5) " current dens. manage. opps." goes here

Appendix 4: map 6) “ future dens. manage. opps.” goes here

TABLE 1
ROAD SUMMARY

ROAD STATUS	SURFACING			TOTAL MILES	TOTAL MILES%	ROAD DENSITY
	BLACK TOP	ROCK	NAT.			
Total Roads in Watershed	14.4	259.8	27.8	302.0	100.0	4.6
BLM Controlled Roads on BLM	0.0	95.9	18.8	114.7	38.0	1.8
BLM Controlled Roads on Private	0.0	8.5	0.2	8.7	2.9	0.1
Private Controlled Roads on Private	0.0	25.2	7.9	33.1	11.0	0.5
Private Controlled Roads on BLM	0.0	4.8	0.6	5.4	1.8	0.1
County Controlled Roads	0.7	1.9	0.0	2.6	0.9	0.0
USFS/BPA Controlled Roads	4.2	6.2	0.4	10.8	3.6	0.2
State of Oregon Controlled Roads	9.5	0.0	0.0	9.5	3.1	0.1
Private Non Inventoried Roads *	N/A	N/A	N/A	117.6	38.9	1.8
BLM Non Inventoried TRZ Roads **	0.0	0.0	0.0	35.7	N/A	0.5
BLM Controlled Roads Providing Access to Private Lands	0.0	81.4	0.0	81.4	27.0	N/A
BLM Roads Closed by Gates	0.0	0.0	0.0	8.7	2.9	N/A
BLM Roads Closed by Other Means ***	0.0	0.0	0.0	14.3	4.7	N/A

* Unknown Status or Surface Type

** Skid Roads, Jeep Roads, Trails, etc.

*** Ditches, Earthberms, Vegetation, Logs/Debris

TRANSPORTATION MANAGEMENT PLAN (TMP) PROCESS

A. Field inventory and data collection by Resource Area personnel
   1. determine present location and condition of roads and drainage structures
   2. collect information on streams and landscape condition adjacent to roads

B. Watershed Team identifies management/legal constraints and uses for each road
   1. guidance from RMP, Access documents, and Federal Code of Regulations
   2. determine preferred road use (forestry, recreation, commuter)

C. Watershed team analysis of each road
   1. establish desired future condition of roads (open vs closed)
   2. based on weighing constraints against primary uses
   3. identify which constraints and uses are of primary importance for each road system

D. Watershed team develops Transportation Management Objectives (TMOs) for each road
   1. transportation engineering has lead
   2. evaluate potential management actions for cost/benefit to resources

E. Team identifies and prioritizes potential projects (restoration opportunities)
   1. identify types of closures (permanent, temporary, seasonal)
   2. projects should mitigate concerns on roads kept open
   3. establish a prioritized list of projects

F. Present proposed road management actions to Area Manager for approval
   1. includes prioritized list of projects
   2. proposed implementation costs

G. Establish a monitoring system to evaluate continued management actions on the transportation system
   1. additional inventory of all drainage structures
   2. periodic field review of Transportation System to monitor condition and types of use
   3. install traffic counters to monitor vehicle use patterns and average daily traffic (ADTs)
   4. track maintenance costs on roads to assist in project planning

Table 2
High Flow Events at the NF Alsea Gauging Station 1957-1989

DATE	DISCHARGE (CFS)	RECURRENCE INTERVAL(YEARS) ANNUAL EXCEEDANCE PROBABILITY (%)
2-9-60	3,670	2 yrs., 50%
2-10-61	5,230	"
1-25-64	4,340	"
12-24-64	4,540	"
1-27-65	4,010	"
3-9-66	4,500	"
1-20-72	4,890	"
1-21-72	5,070	"
11-15-73	4,730	"
12-4-75	3,700	"
12-13-77	4,240	"
1-12-80	4,144	"
12-25-80	5,140	"
12-6-81	4,170	"
1-23-82	3,990	"
1-2-87	3,810	"
11-24-60	6,110	5 yrs., 20%
12-21-64	5,670	"
1-15-74	5,800	"
1-16-74	5,830	"
12-23-64	8,180	25 yrs., 4%
1-28-65	7,570	"
12-22-64	11,600	50 yrs.+, 2%

APPENDIX 4: map 7) transient snow zone goes here

APPENDIX 4: map 8) reach class. goes here

APPENDIX 4: map 9) motorcycle trails goes here

APPENDIX 4: map 10) high temp. streams goes here

APPENDIX 4: map 11) LWD pot. goes here

APPENDIX 4: map 12) special habs. goes here

APPENDIX 4: map 13) salmon dist. goes here

APPENDIX 4: map 14) trout dist. goes here

N. F. Alsea Watershed
Stream Habitat and Condition

Honey Grove

Honey Grove Creek is a fifth order stream that flows into the N. F. Alsea from the east about 1.8 miles above the mouth of the N. F. Alsea. Its subwatershed includes about 4,449 acres and 49.8 miles of stream; BLM and USFS manage about 2,051 acres and 23.1 miles of stream. ODFW estimates that 3.6 miles of coho spawning habitat is potentially good habitat. Little is known about this subwatershed since Honey Grove Creek was last surveyed in 1950 by ODFW. It is assumed that all species present within the watershed are present in this subbasin except spring chinook salmon. Based on gradient and confinement, Honey Grove Creek is considered good potential habitat for anadromous fish. This stream was walked during the summer of 1995, and there were schools of fish throughout the reach on BLM managed land.

Seely Creek

Seely Creek, located one mile above Honey Grove Creek, is a fourth order stream and has one of the smallest subwatersheds, consisting of 1,984 acres. Seely Creek has 24 total miles of stream of which BLM manages 6.8 miles for fisheries. Little is known about Seely Creek, but it is assumed to be similar to Honey Grove Creek. Species of fish present are identical to Honey Grove Creek. ODFW estimates that there are 2.5 miles of coho spawning habitat in this subwatershed which may be the best coho habitat in the North Fork Alsea River.

Crooked Creek (Frontal, Yew Creek, and Upper Crooked Creek)

Crooked Creek is the largest tributary to the N. F. Alsea River; its watershed covers approximately 10,276 acres, of which BLM and USFS manage approximately 5,257 acres. There may also be limited spawning in lower Crooked Creek as it has an estimated 9.2 miles of coho spawning habitat, but it is thought to lack juvenile winter habitat (ODFW). In the analysis (House 1986), Crooked Creek was divided into three subwatersheds: Crooked Creek Frontal (4,664 acres), Yew Creek (2,430 acres) and Upper Crooked Creek (3,182 acres).

Crooked Creek Frontal includes Ernest Creek, Baker Creek, Zahn Creek, Cabin Creek and various other very small, unnamed tributaries. There are no known current data for Crooked Creek Frontal subwatershed other than a survey conducted on Ernest Creek, which began at the confluence of Ernest Creek and Crooked Creek. For the purposes of this survey, Ernest Creek was broken into three reaches.

The first reach extended upstream 452 meters; secondary channels resulted in an additional 120 meters. The valley form was broad valley floor with 100% multiple terraces. The Valley Width Index (VWI) was very broad at 14.5. The stream channel was constrained by terraces. The average gradient of 3.1% was dominated by riffle and rapid habitat types, although scour pools, and dammed and backwater pools accounted for nearly 15% of the wetted channel area. Water temperature was constant at 50 ^{o}F.

Bank stability was high with no active erosion; stream banks were undercut 5.5%. Large woody debris was considered low with 10.6 pieces/100 m. A diversion dam fed a small pond on private land just north of the stream.

Reach 2 began at 452 meters and continued upstream for 361 meters. Secondary channels resulted in an additional 91 meters. The valley form was broad valley floor with multiple terraces; VWI was broad at 7.0. The stream channel was alternately constrained by terrace and hillslope. The average reach gradient of 4.8% was dominated by rapid over boulder, rapid over bedrock, and riffle habitat types. Scour pools, and dammed and backwater pools comprised approximately 14% of the wetted area. Water temperature was constant at 50 ^{o}F. Bank stability was high with no active erosion; stream banks were undercut 5.9%. The LWD complexity was low at 1.3, with 22.2 pieces/100 m.

Reach 3 began at 813 meters and continued upstream for 414 meters. Secondary channels contributed an additional 91 meters. The valley form changed to narrow valley floor with a moderate V-shape. The VWI was narrow at .20. The stream channel was constrained by hillslope. The average gradient of 14.1% was dominated by cascade and rapid habitat types. Water temperature was constant at 51 ^{o}F. Banks were stable with less than 2% actively eroding; stream banks were 12% undercut. The LWD complexity was modest with 33.3 pieces/100 m.

Yew Creek is a fourth order stream which was surveyed in 1993 using ODFW protocols. The survey began at the confluence of Yew Creek and Crooked Creek and continued upstream 7,333 meters to its conclusion. During this survey, Yew Creek was divided into 6 reaches. A general description of Yew Creek is as follows: on a scale of 1-5, the average complexity score for Large Woody Debris (LWD) in the stream was 3.0. This figure indicates that large woody debris was present in moderate amounts, typically as combinations of single pieces and small accumulations. The overall stream gradient was 5.7%, with some undercut and relatively stable banks. Gravel was the most frequently occurring of all substrate types. Fish were commonly observed throughout the survey, crayfish and a newt were seen, and beaver activity was common, particularly in the upper stream sections. One tributary of Yew Creek was surveyed.

The first reach began at the confluence of Yew Creek and Crooked Creek and extended upstream 1,535 meters. The valley form was broad valley floor constrained 100% by multiple terraces. The stream channel was constrained by high terraces; the Valley Width Index (VWI) was broad at 9.5. The average gradient of 6.6% was dominated 79% by the cascade habitat type. Water temperature was constant at 53 ^{o}F. Bank stability was good, with only 4% of the banks showing active erosion. An average 8% of the stream bank was undercut. The average LWD complexity score was modest to moderate, with 14.9 pieces/100 m. Debris dams were common.

Reach 2 began at 1,535 meters and continued upstream for 366 meters. The valley form was broad valley floor with multiple terraces. The stream channel was 100% constrained by alternating terraces and hillslopes. The VWI was broad at 4.7. The average reach gradient of 7.9% was dominated 75% by the cascade habitat type. Water temperature was constant at 53 ^{o}F. Bank stability was fair with 13% of the bank actively eroding; the stream banks were 3% undercut. The average LWD complexity score was modest at 2.3, with 19.7 pieces/100m. Debris dams were common.

Reach 3 began at 1,901 meters and continued upstream for 445 meters. The valley form was narrow valley floor with a steep V-shape. The stream channel was 100% bedrock constrained. The VWI was narrow at 2.5. The average gradient of 8.3% was dominated 54% by scour pools and 35% by cascade habitat types. Water temperature was constant at 52 °F. Banks were stable with no active erosion; the stream banks were 3% undercut. The average LWD complexity score was modest at 2.2, with 13.0 pieces/100m. Debris dams were common.

Reach 4 began at 2,346 meters and continued upstream 2,293 meters. The valley form was broad valley floor constrained 85% by terraces and 15% by multiple terraces. The stream channel was constrained 100% by alternating terrace and hillslope. The VWI was broad at 6.8. The average gradient of 11.4% was dominated 75% by the cascade habitat type. Water temperature ranged between 51 and 52 °F. Bank stability was fair, with 9% of the banks actively eroding; the stream banks were 4% undercut. The average LWD complexity was moderate, with 36.8 pieces/100m. Debris dams were common.

Reach 5 began at 4,639 meters and continued upstream for 980 meters. The valley form was narrow valley floor with a steep V-shape. The stream channel was hillslope and bedrock constrained. The VWI was narrow at 2.2. The average gradient of 7.2% was dominated 52% by dammed and backwater pools reflecting a high degree of beaver activity. Small stream habitat types comprised an additional 37% of the wetted surface. Water temperature varied between 59 and 64 °F. Bank stability was fair with 13% actively eroding. The stream banks were less than 1% undercut. The average LWD complexity score was moderate to moderately high at 3.9, with 26.4 pieces/100m. This stream section contained more medium and large pieces of wood arranged in more complex accumulations. Beaver activity and debris dams were common.

Reach 6 began at 5,619 meters and continued upstream for 1,714 meters. The valley form was broad valley floor constrained 50% by terraces and 50% by multiple terraces. The stream channel was 100% constrained by alternating terrace and hillslope. The VWI was broad at 4.0. The average reach gradient of 8.0% was dominated 45% by small stream habitat types and 44% by dammed and backwater pools. Water temperature ranged between 56 and 57 °F. Bank stability was poor with 18% of the banks showing active erosion; the stream banks were 3% undercut. The average LWD complexity score was moderate to high at 3.6, with 33.9 pieces/100m. Beaver activity and debris dams were common.

Upper Crooked Creek includes the headwall tributaries of Crooked Creek. Upper Crooked Creek has 37.7 total miles of stream, of which BLM manages 27.9. It is estimated that 14.7 miles of stream is used by fish. Alder Creek is the only named tributary in this subwatershed.

Parker Creek

Parker Creek is a fifth order stream, and its subwatershed has 54.3 total miles of stream of which BLM manages 42.9. Parker Creek habitat types were described as consisting of 70% rapids, 8% pools, 13% cascades, 10% riffles, and 9% pools. The substrate in this stream consisted of 28% gravel, 28% cobble, 17% boulder, 13% fine sediments, and 14% bedrock. Based on surveys by House (1986), there were 15 key pieces of wood ("key piece" is wood > or = 10 m long x 0.6 m in diameter). Parker Creek sub-basin is 5,432 acres and consists of 54.4 miles of stream. Parker Creek has no anadromous fish usage, but there are 24.2 miles of resident trout usage.

In 1994 Parker Creek was surveyed using the ODFW protocols. The survey began at the confluence with the North Fork Alsea and extended 4,495 m. Four reaches were surveyed, and habitat was predominantly rapids. No fish survey was conducted on this stream. In reach 3, there were three natural barriers: one 2 meters high, one 5 meters high, and one 9.3 meters high. Given the amount of LWD and complex pools percentage, these appear to be lacking. Land ownership is Willamette Industries and state forests. These data also included the survey for Parker Creek tributary, which has three reaches and began at the confluence of Parker Creek and extended 2,514 m. No fish survey was conducted on this tributary stream. There was a 4 meter high barrier over bedrock in reach 3, and the undercut bank average appeared exceptionally high given the average gradient and lack of bank stability. There was also a high percentage of fine sediments which seemed uncharacteristic for a reach of this gradient. There also was a lack of wood and complex pools.

Reach 1 began at the confluence with the N. F. Alsea River and extended 1,088 m. The channel was constrained within steep V-shaped hillslopes. The valley width index was 2. Average unit gradient is 1.5%. Stream habitat was 21% scour pools and 69% rapids. Substrate was 14% fine sediments, 41% gravel, 25% cobble, 11% boulder and 9% bedrock. There were no key pieces of wood in this reach (“key piece” is wood > or = 10 m long x 0.6 m in diameter). The stream banks were 7% actively eroding, 71 % boulder-cobble and 18% non-erodible.

Reach 2 extended 1,470 m, and its channel was constrained by terraces. The valley width index was 3.6. Average unit gradient was 2.1%. Stream habitat was 7% dammed pools, 7% scour pools, and 12% bedrock. There was one key piece of wood. The banks were 6% vegetation stabilized, 67% boulder-cobble and 22% non-erodible. Open sky was 26%.

Reach 3 extended 1,484 m, and the channel was constrained within moderate and steep V-shaped hillslopes. The valley width index was 1.7. Average unit gradient was 3.1%. Stream habitat was 14% scour pools, 8% riffles, 61 % rapids and 13% cascades. Substrate was 17% gravel, 23% cobble, 17% boulder and 35% bedrock. There were 15 key pieces of wood. The banks were 4% vegetation stabilized, 64% boulder-cobble and 32% non-erodible. Open sky was 21%.

Reach 4 extended 453 m, and the channel was constrained by terraces. The valley width index was 5.5. Average unit gradient was 2.2%. Stream habitat was 3% scour pools, 8% glides and 89% rapids. Substrate was 30% gravel, 30% cobble, 21% boulder and 6% bedrock. There were 3 key pieces of wood.
The banks were 81% boulder-cobble and 15% non-erodible. Open sky was 24%.

Parker Creek tributary reach 1 was described as having a channel 333 m long and constrained within steep V-shaped hillslopes. The valley width index was 1. Average unit gradient was 5.9%. Stream habitat was 5% scour pools, 5% riffles and 88% rapids. Substrate was 24% fine sediments, 30% gravel, 25% cobble, 16% boulder and 5% bedrock. There were 4 key pieces of wood in this reach. The stream bank were 9% actively eroding, 30% boulder-cobble and 60% vegetation stabilized. Undercut banks were 2.8%. Open sky was 59%.

Reach 2 extended 837 m and the channel was constrained by terraces. The valley width index was 8.9. Average unit gradient was 3.0%. Stream habitat was 8% scour pools, 16% riffles and 75% rapids. Substrate was 25% fine sediments, 39% gravel, 27% cobble and 6% boulder. There were 4 key pieces of wood. The banks were 21% vegetation stabilized, 41% boulder-cobble, 5% non-erodible and 33% actively eroding. Undercut banks were 14.5%. Open sky was 28%.

Reach 3 extended 1,344 m. The channel was constrained within moderate and steep V-shaped hillslopes. The valley width index was 1.9. Average unit gradient was 10.5%. Stream habitat was 14% riffles, 58% rapids and 22% cascades. Substrate was 39% fine sediments, 38% gravel, 17% cobble, 4% boulder. There were 15 key pieces of wood. The banks were 7% vegetation stabilized, 13% boulder-cobble and 81% actively eroding. Open sky was 18%.

Racks Creek

Racks Creek is a fifth order stream whose watershed covers 3,176 acres. This creek has 37.8 total miles of streams of which BLM manages 18.7. The estimated fish miles are 19. In 1993, Racks Creek and two Racks Creek tributaries were surveyed using the ODFW protocol. Racks Creek survey began at the confluence of Racks Creek and the North Fork Alsea and continued upstream 5,694 meters to its conclusion. For survey purposes, Racks Creek was described in 6 reaches. This creek was generally described as follow: large woody debris complexity was indicated as being present in modest to moderate numbers, typically as combinations of small single pieces and small accumulations. The overall stream gradient was 1.7%, with a moderate incidence of undercut banks. Stream bank stability was low with a high incidence of active erosion. Gravel was the most frequently occurring of all substrate types. Fish and crayfish were observed in portions of the creek, and beaver dams and activity were common throughout.

Reach 1 extended upstream 770 meters. Secondary channels contributed 53 meters. The valley form was broad valley floor constrained 100% by terraces. The stream channel was constrained by alternating terrace and hillslope. The valley width index was broad at 5.0. The average gradient of 3.4% was dominated 24% by rapid, 21% by scour pools, and 15% by dammed and backwater habitat types. Water temperature was constant at 57 ^{o}F. Stream bank stability was low with 18% actively eroding. An average 6% of the stream banks were undercut. The average LWD complexity score was modest at 2.1, with 15.2 pieces/100 m. Beaver dams were common and fish were observed.

Reach 2 began at 770 meters and continued upstream for 310 meters. The valley floor had a moderate V-shape. Secondary channels contributed 19 meters. The stream channel was 100% hillslope constrained. The VWI was narrow at 2.0. The average gradient of 1.6% was dominated 52% by riffle habitat types, with scour pools accounting for an additional 25% of the wetted channel area. Water temperature was constant at 58 ^{o}F. Bank stability was high with no active erosion. The stream banks were not undercut. The average LWD was low to moderate with 11.3 pieces/100 m. Several fish were observed.

Reach 3 began at 1,080 meters and continued upstream 759 meters. There were no secondary channels. The valley form was broad valley floor constrained 100% by terraces. The stream channel was constrained 100% by alternating terrace and hillslope. The VWI was broad at 5.8. The average gradient of 2.1% was dominated 37% by rapid and 27% by riffle habitat types. Scour pools accounted for an additional 26% of the wetted channel area. Water temperature was constant at 58 ^{o}F. Stream bank stability was low with 17% of the banks actively eroding. The stream banks were 7% undercut.

Gravel was the most frequently occurring of all substrates at 35%. The average LWD complexity was low with 12.0 pieces/100m. There were several debris dams in the section.

Reach 4 began at 1,839 meters and continued upstream 1,434 meters. Secondary channels accounted for additional 189 meters. The valley form was broad valley floor constrained 94% by multiple terraces and 6% by terraces. The stream channel was constrained 94% by terraces and 6% by alternating terrace and hillslope. The VWI was broad at 16.9. The average gradient of 0.9% was dominated 46% by the dammed and backwater pool habitat type, reflecting the high incidence of beaver activity. Water temperature ranged between 54 and 59 °F. Stream bank stability was low with 40% of the banks actively eroding. The stream banks were 10% undercut. Gravel was the most frequently occurring of all substrates at 35%. The average LWD complexity was modest to moderate with 20.4 pieces/100 m.

Reach 5 began at 3,273 meters and continued upstream 722 meters. There were 13 meters of secondary channels. The valley form was broad valley floor constrained 100% by terraces. The stream channel was constrained 100% by alternating terrace and hillslope. The VWI was broad at 8.0. The average gradient of 0.8% was dominated 40% by dammed and backwater pool habitat types, continuing to reflect the high incidence of beaver activity. Water temperature was constant at 57 °F. Stream bank stability was low with 49% of the banks actively eroding. The stream banks were 6% undercut. Gravel was the most frequently occurring of all substrates at 34%. The average LWD complexity was moderate with 26.5 pieces/100 m.

Reach 6 began at 3,995 meters and continued upstream 1,699 meters to the survey conclusion. Secondary channels resulted in an additional 103 meters. The valley form was broad valley floor constrained 70% by terraces and 30% by multiple terraces. The stream channel was constrained 93% by terraces and 7% by alternating terrace and hillslope. The VWI was broad at 17.7. The average reach gradient of 1.4% was dominated 60% by riffle habitat types. Water temperature ranged widely between 48 and 55 °F. Bank stability was poor with 20% of the banks showing active erosion. The stream banks were 4% undercut. The average LWD complexity was modest to moderate with 14.0 pieces/100m. Active beaver sites and debris dams were common.

Racks Creek tributary 1 survey began at the confluence of Racks Creek tributary and Racks Creek, and continued upstream 1,130 meters to its conclusion in a dry channel. LWD was present in moderate to moderately high amounts, typically as medium to large pieces in accumulations and debris jams. The average stream gradient was 8.1%, with a low incidence of undercut banks. Stream bank stability was good with few areas of active erosion. Gravel was the most frequently occurring of all substrate types. Fish were observed throughout this tributary and debris dams were common.

Racks Creek tributary 10 survey began at the confluence of Racks Creek tributary 10 and Racks Creek, and continued upstream 225 meters to its conclusion in a dry channel. LWD was present in modest to moderate amounts, typically as combinations of single pieces and small accumulations. The average stream gradient was 3.9%, with a moderate incidence of undercut banks. Stream bank stability was low with a high frequency of active erosion. Gravel was the most frequently occurring of all substrate types at 62%. Beaver activity was also observed.

Table 3
N. F. Alsea Watershed
Major Stream Obstructions

The following is a list of obstructions recorded in the North Fork Alsea Drainage during the summer surveys of 1985, 1986 and 1995.

Stream	Type of Obstruction	Height (in feet)	Passable?	Correction Feasible?
North Fork	Dam	10	Partially	Yes
Mainstem	Waterfall /cascade Waterfall Waterfall /cascade	15 20 15	Partially No No	No No No
Slick Creek	Waterfalls (3)	60	No	No
Parker Creek	Log jam Waterfalls (3)	10 15	No No	No No
Racks Creek	Waterfalls (2)	12	No	No
Additional Barriers located in the North Fork Alsea River Watershed				
Ernest Creek	Waterfall (1) and many cascades	60^{+}	No	No

APPENDIX 4 = map 15) prod. flats goes here

APPENDIX 4 = map 16) landslide pot. goes here

Plant Associations

Plant associations have been identified for the Siuslaw National Forest for the western hemlock and Sitka spruce series (Hemstrom and Logan 1986). Because of its proximity to the Siuslaw, these associations also apply for the N. F. Alsea watershed, and in fact, the watershed is comprised of vegetation in the western hemlock series. Due to widespread, intense fire during the past 150 years, much of the western hemlock series is now dominated by Douglas-fir and red alder. A summary of the plant associations for this series follows based on work by Hemstron and Logan (1986):

•**western hemlock/devil's club** - Douglas-fir and western hemlock dominate the canopy. Many stands contain substantial amounts of western red cedar and red alder. Canopy closure averages 75 percent. Western hemlock and, to a smaller degree, western red cedar are the major regenerating species. The shrub layer is diverse. Devil's club cover is over 5 percent and averages 24 percent. Vine maple, salmonberry, red huckleberry, and fool's huckleberry may be important. Shrub cover averages 56 percent. Oxalis and sword fern are the major herbs. Other herbs indicating wet sites are usually present ; especially, lady fern, maidenhair fern, Mexican betony, and mountain wood-fern. Several other herbs are common: deer fern, Siberian montia, sweet-scented bedstraw, and Pacific trillium. Herb cover averages 74 percent. This association occurs in poorly drained concave topography and near seeps. Soils are saturated, or nearly so, throughout the year. This type occurs only in small, localized areas in the watershed.

•**western hemlock/salmonberry**- Douglas-fir usually dominates the canopy, closely followed by red alder and western hemlock. Western hemlock is the major regenerating species. Many stands are occupied by nearly pure red alder canopy with scattered, larger Douglas-fir and hemlock. The successional development of red alder stands that lack western hemlock is unclear, since red alder typically senesces at 100-150 years of age and Douglas-fir does not regenerate under a canopy. The climatic and environmental nature of the stands suggests that western hemlock would be the climax if seed sources had not been eliminated by disturbance. Most stands have at least some tolerant conifer seed sources. Salmonberry cover averages 51 percent. Other important shrub species include fool's huckleberry, elderberry, and red huckleberry. Shrub cover averages 74 percent. The dense shrub layer generally inhibits herbaceous development. Oxalis, Mexican betony, Siberian montia, false lily-of-the-valley, sword fern, deer fern, maidenhair fern, fairy bells, field wood rush, and sweet-scented bedstraw are present in small amounts in most stands. Sword fern averages over 44 percent cover. Oxalis may be abundant. This association occurs on well-watered sites. It is most commonly found in moist riparian zones within the watershed. Soils are saturated much of the year, but are not as wet or poorly drained as in the devil's club association. It also occurs on middle and lower slopes on north or northeast aspects.

•**western hemlock/salmonberry/vine maple**- Douglas-fir dominates the canopy. Western hemlock occurs in the canopy of about one-third of the stands and occasionally occurs in the regeneration layer. Red alder is a major canopy species in about two-thirds of the plots. Big-leaf maple is relatively uncommon. Salmonberry and vine maple dominate the shrub layer. Red huckleberry is present in small amounts in most stands. Salal, California hazel, cascara, buckthorn, elderberry, and a few other shrubs may be present. This association represents the more inland end of the salmonberry spectrum. It occurs at higher elevations on warmer, slightly drier sites than the western hemlock/salmonberry association.

Plant Associations

•**western hemlock/salmonberry-salal**- Douglas-fir and western hemlock dominate the canopy in most stands. Many stands have a substantial red alder component. Conifer regeneration is uncommon but may include western hemlock and western red cedar. The shrub layer is a dense mix of salmonberry and salal supplemented by minor amounts of red huckleberry, vine maple, Oregon grape, and evergreen huckleberry. Shrub cover averages 84 percent. Sword fern is the only abundant herb. Other common herb species are Siberian montia, field wood rush, and Pacific trillium. Total herb cover averages 32 percent. This association occurs in high rainfall areas where the western hemlock/salmonberry association extends nearly up to the ridge line. It is uncommon in the watershed but is more prevalent in the Lobster Valley and Harlan areas.

•**western hemlock/oxalis** - Douglas-fir usually dominates the canopy. Western hemlock is present in the canopy of most stands and in the regeneration layer of many stands. Western red cedar may be abundant. Red alder was present in 35 percent of the sample plots, occasionally as the major canopy species. The shrub layer is usually sparse. Red huckleberry and salmonberry are present in small amounts in many stands. Shrub cover averages 30 percent. Oxalis forms a dense carpet except in heavily shaded stands. Sword fern cover averages 44 percent. Fairy bells, Siberian montia, lady fern, deer fern, Pacific trillium, and sweet-scented bedstraw commonly occur. Herb cover averages 71 percent. The western hemlock/oxalis association occurs on moist slopes, benches, and alluvial terraces generally above 500 feet.

•**western hemlock/sword fern** - Douglas-fir usually dominates the canopy, commonly associated with western hemlock. Western red cedar was present in half of the sample plots. Both western hemlock and western red cedar may be present in the regeneration layer, but western hemlock is more common and abundant. A few sample plots had substantial red alder canopies. Big-leaf maple may be present .. Red huckleberry, salal, salmonberry, vine maple, and fool's huckleberry may be present, but the shrub layer is relatively sparse. Total shrub cover averages 22 percent. Sword fern is the major herb. Many other species may be present in small amounts including Siberian montia, oxalis, deer fern, fairy bells, Pacific trillium, evergreen violet, and sweet-scented bedstraw. Herb cover averages 65 percent. This association occurs on middle to lower slopes and less often on benches and alluvial flats. Slopes are usually steep. Soils are well-drained but receive continuous subsurface moisture from upslope.

•**western hemlock/vine maple/sword fern**- Douglas-fir usually dominates the canopy. Western hemlock and western red cedar are common. Western hemlock regeneration was present in 22 percent of the sample plots. Some sites have mixed alder-conifer canopies. Big-leaf maple frequently occurs. Vine maple is always present, averaging 52 percent cover. Red huckleberry, salal, and salmonberry are common in small amounts. Shrub cover averages 70 percent. Sword fern dominates the herb layer, averaging 61 percent cover. Oxalis, Siberian montia, sweet-scented bedstraw, and Pacific trillium are present in most stands at less than 10 percent cover each. This association is similar in many respects to the western hemlock/sword fern association. It occurs on warm sites with all combinations of elevation, aspect, and slope. Soils are well-drained but retain adequate soil moisture in summer. It is most common on steep middle and lower slopes between 500 and 1,000 feet elevation.

Plant Associations

•**western hemlock/salal** - Douglas-fir dominates the canopy. Western hemlock is present in the regeneration and canopy layers on most sites. Small amounts of western red cedar may be present. Red alder occurred on about a third of the sample sites. Big-leaf maple and golden chinquapin are occasionally present. Salal is usually dense. Vine maple, Oregon grape, red huckleberry, and trailing blackberry occur in relatively low abundance. On more moist sites, salmonberry and thimbleberry may be present. Total shrub cover averages over 70 percent. The herb layer is dominated by sword fern. Bracken fern is often abundant in stands which have been thinned or recently disturbed. Trace amounts of a few other herbs occur, including sweet-scented bedstraw, fairy bells, and Pacific trillium. Stands with particularly heavy salal cover have usually been disturbed and may lack an appreciable herb layer, except for sword fern. This association is most prominent on south- or west-facing upper slopes and ridges. It also occurs on upper-slope slump faces and flats. Soils are well-drained. Summer moisture stress is probably higher in the salal association than in lower-slope associations. This association is fairly widespread in the watershed.

•**western hemlock/vine maple-salal** - Douglas-fir dominates the canopy in most stands. Western hemlock and western red cedar are occasionally present. The canopy is relatively open compared to other associations. Regeneration is sparse or absent. A few stands have a substantial red alder or big-leaf maple canopy. The dense shrub layer, consisting mainly of salal and vine maple, averages nearly 100 percent cover. A few other shrub species are common, including red huckleberry, trailing blackberry, and evergreen huckleberry. The herb layer ranges from nearly absent beneath the tangle of shrubs to 50 percent sword fern cover. Pacific trillium and sweet-scented bedstraw are the only other common herbs. This association is very similar to the western hemlock/salal association. Both occur on well-drained middle to upper slopes and ridges. It is also fairly common in the watershed.

•**western hemlock/Oregon grape-salal** - Douglas-fir dominates the canopy. Many sites have small amounts of western hemlock and western red cedar in the canopy and regeneration layers. Some stands have minor red alder, big-leaf maple or golden chinquapin canopy components. Salal and Oregon grape dominate the shrub layer. Vine maple or evergreen huckleberry may be abundant. Red huckleberry is common in most stands. Other shrubs, especially Pacific dogwood, baldhip rose, trailing blackberry, and ocean-spray may be present. Sword fern is the major herb. Several other herbs occur in most stands: sweet-scented bedstraw, western starflower, redwoods violet, Pacific trillium, fairy bells, and California fescue. Herb cover averages 33 percent. This association is similar to the western hemlock/Oregon grape association. It is most common at upper elevations (average 1,385 feet in the Alsea Ranger District). Soils tend to be less stoney and sites more northerly-facing than in the western hemlock/Oregon grape association.

•**western hemlock/Oregon grape** - Douglas-fir dominates the canopy. Western hemlock co-dominates in many stands and is the major regenerating species. Western red cedar occurs in some stands and is a minor climax species. Big-leaf maple is more common than red alder. Oregon grape is the major understory shrub, usually in association with salal. Vine maple may be abundant on some sites. Several other shrubs are common: trailing blackberry, red huckleberry, baldhip rose, California hazel, and ocean-spray. Shrub cover averages 45 percent. Sword fern dominates the herb layer. Other common herbs include: Siberian montia, oxalis, fairy bells, California fescue, sweet-scented bedstraw, western starflower, Pacific trillium, and redwoods violet. Herb cover including sword fern averages 50 percent.

Plant Associations

This association occurs at upper elevations (average 1,285 feet) on east, south, and west-facing slopes. Sites are usually on middle to upper slope positions on well-drained soils. At least one-third of the sites had exposed bedrock at the surface.

•**western hemlock/rhododendron/sword fern**- Douglas-fir dominates the canopy, often in association with western hemlock and western red cedar. Both western red cedar and western hemlock regenerate in many stands. Western hemlock is the major regenerating species. Big-leaf maple is present in nearly half the stands. Red alder is not as common. The diverse shrub layer averages 45 percent cover and usually includes red huckleberry, salal, vine maple, Oregon grape, evergreen huckleberry, and rhododendron. Species other than rhododendron and vine maple have relatively low covers. Sword fern cover averages 53 percent. Several other herbs, including sweet-scented bedstraw, Pacific trillium, and fairy bells may be present in small amounts. This association is the most moist of the rhododendron-dominated associations. It occurs on steep, well-drained, northerly-facing slopes.

•**western hemlock/rhododendron-salal**- Douglas-fir dominates the canopy. A few sites have scattered western hemlock in both the overstory and regeneration layers. Red alder occurs on some plots, but big-leaf maple is the most common hardwood. The shrub layer is profuse. Rhododendron and salal usually dominate. Vine maple, Oregon grape, evergreen huckleberry, and red huckleberry commonly occur. Some sites and ridges have a dense rhododendron layer which excludes most other species. Total shrub cover averages 51 percent. Herbs other than sword fern are not abundant. Sword fern cover varies from nearly 0 to 70 percent. A few sites have traces of Pacific trillium, oxalis, and a few other herbs. Herb cover averages 27 percent. This association occurs on well-drained slopes and ridges. Most sites are southerly-facing with steep, rocky soils. Nitrogen appears to be limiting on some sites and the canopy may be chlorotic.

•**western hemlock/rhododendron-Oregon grape**- Douglas-fir and western hemlock dominate the canopy. Western red cedar may be present. Conifer regeneration is usually sparse. Big-leaf maple is the major hardwood and occurred on one-third of the sample plots. The shrub layer is diverse and dense. Oregon grape and rhododendron are usually accompanied by salal, red huckleberry, vine maple, evergreen huckleberry, trailing blackberry, and ocean spray. Shrub cover averages 80 percent. Sword fern dominates the herb layer, averaging 32 percent cover. Other herb species occur in small amounts. This association occurs on ridge lines, mostly on southerly-facing, steep slopes. Plant moisture stress in summer is probably high enough to substantially slow conifer growth. Douglas-fir on nearby sites appear to be chlorotic from poor nitrogen status. Lower soil nitrogen may be the result of intense natural fire (which increases volatilization of nitrogen in the duff and surface soil) and a general absence of nitrogen fixing species during early succession.

APPENDIX 4: map 17) veg. classes goes here

APPENDIX 4: map 18) P. laxiflora sites goes here

Scientific Name	OC	Habitat	El	Seral Stage	Assoc. SP
Albatrellus avellaneus	S	coastal		OG	conifer/hardwood mix
Albatrellus ellsii	S	coastal		OG	conifer/hardwood mix
Albatrellus flettii	S	coastal		OG	conifer/hardwood mix
Aleuria rhenana	U	well-developed forest litter	l,m.h		conifer
Aleurodiscus farlowii	U	on wood, humus, litter, & stumps			
Alpova alexsmithii	U			mat-OG	conifer
Alpova sp. nov.# Trappe1966	U				conifer
Arcangeliella sp. nov. #Trappe12359	S	old-growth legacy of coarse woody debris in fog belt	l,m	mat-OG	PISI, TSHE
Asterophora lycoperdoides	U	fruit bodies of other fungi		LS	
Asterophora parasitica	U	fruit bodies of other fungi		LS	
Baeospora myriadophylla	U	litter, humus or dead wood		LS	conifer
Balsamia nigrens	S	coarse wood, xeric forests	l		
Boletus haematinus	U				Abies
Boletus piperatus	S	coarse woody debris	l,m	OG	conifers
Boletus pulcherrimus	S		l	mat-OG	conifers
Bryoria tortuosa	S	coast and mesic	l.m		oaks and conifers
Calicium abietinum	S			OG	conifer
Calicium adaequatum	S	humid forest conditions; substrate & texture specific		OG	conifer
Calicium adspersum	S			OG	

APPENDIX 4

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:

Present (P): documented | Remote possibility (R): | l = below transien
Highly probable (H): | Unknown (U): | m = transient snow zone
Suspected (S): | | h = subalpine & alpine

Calicium glaucellum	S			OG	
Calicium viride	S	humid forest conditions; substrate & texture specific		OG	
Cantharellus cibarius, C. subalbidus, C. tubaeformis,	P	coarse woody debris	l,m	mat-OG	conifer/hardwood
C. formosus	S				
Catathelasma ventricosa	U	habitat not completely known			
Cetrelia cetrariodes	S	foggy, riparian OG-forest	l,m	OG	hardwood/conifers
Chaenotheca brunneola	S			OG	
Chaenotheca chrysocephala	S			OG	
Chaenotheca ferruginea	S			OG	
Chaenotheca furfuracea	S			OG	
Chaenotheca subroscida	S			OG	
Chaenothecopis pusilla	S			OG	
Chamonixia pacifica sp. nov. #Trappe12768	S		l,m	mat-OG	TSHE, PISI, PSME
Choiromuces alveolatus	S	coarse woody debris	h		
Choiromyces venosus	S		l,m		mixed conifer/hardwood
Chroogomphus loculatus	U		um	OG	pinaceae

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:
Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
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Chrysomphalina grossula	U				
Cladonia norvegica	U	unknown			
Clavariadelphus sp.	U	cool/cold moist well-developed litter layer		LS	hardwood or conifer
Clavicorona avellanea	S	large woody debris	l,m	LS	
Clavulina cinerea	S	well-developed litter layer		LS	
Clavulina cristata	S	well-developed litter layer		LS	
Clavulina ornatipes	S	well-developed litter layer		LS	
Clitocybe senilit	S	moist, with a deep humus and litter layer	l	LS	conifers
Clitocybe subditopoda	S	moist, deep humus and litter layer	l	LS	conifers
Collema nigrescens	S	foggy riparian forest	l,m	OG	QUGA
Collybia bakerensis	U	recently fallen stumps and logs		LS	conifer

ROD Species Occurrence in the Coast Range

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FSEIS, was determined to be:
Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
Suspected (S): h = subalpine & alpine

Collybia racemosa	U	fruit bodies of other fungi		LS		
Codyceps capitata	U	fruit bodies of other fungi		LS		
Cordyceps ophioglossoides	U	fruit bodies of other fungi		LS		
Cortinarius azureus	U	habitat requirements not known				
Cortinarius boulderensis	U	habitat requirements not known				
Cortinarius canabarba	U	diverse OG forest, woody debris		LS	conifer	
Cortinarius cyanites	U	habitat requirements not known				
Cortinarius magnivelatus	U	habitat requirements not known				
Cortinarius olympianus	U	habitat requirements not known				
Cortinarius rainierensis	U	diverse OG forest, woody debris				

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien

Highly probable (H): Unknown (U): m = transient snow zone

Suspected (S): h = subalpine & alpine

Cortinarius spilomius	U	habitat requirements not known			
Cortinarius tabulariscyanite	U	habitat requirements not known			
Cortinarius valgus	U	habitat requirements not known			
Cortinarius variipes	U	diverse OG forest, woody debris		LS	conifers
Cortinarius verrucisporus	S	montane	h		
Cudonia circinans	U	duff			conifers
Cudonia monticola	U	duff		mat	conifers
Cyphelium inquinans	S			OG	
Cyphellostereum laeve	U	habitat requirements not known			mosses
Democybe humboldtensis	U	habitat requirements not known			
Dendriscocaulon intricatulum	R	wet, boreal riparian	l,m	LS	conifers
Destuntzia fusca	S	Mature coastal forest	l,m	mat-OG	SESE,PSME,Abies,TSHE
Destuntzia rubra	S	mature coastal forest	l,m	mat-OG	SESE,PSME,LIDE,TSHE
Dichostereum granulosum	U	wood, humus, litter & stumps			
Diplophyllum plicatum	S	coastal forest; bark, decaying wood & thin soil over rock		OG	

ROD Species Occurrence in the Coast Range

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FSEIS, was determined to be:

Present (P): documented | Remote possibility (R): | l = below transien
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Suspected (S): | | h = subalpine & alpine

Douinia ovata	S	wet coniferous forest	l,m	OG	PISI conifer
Elaphomyces sp. nov. #Trappe 1038	H	coastal OG legacy	l,m	mat-OG	TSHE, PISI, PSME
Encalypta brevicola var. crumiana	S	shaded foggy rock	l,m	OG	
Endogone oregonensis	P	coast & coast ranges	l	mat-OG	PISI, TSHE
Fayodia gracilipes	U	litter, humus or dead wood		LS	conifer
Galerina atkinsoniana	U	moist; specific details lacking			mosses
Galerina cerina	U	moist; specific details lacking			mosses
Galerina heterocystis	U	moist; specific details lacking			mosses
Galerina sphagnicola	U	moist; specific details lacking			mosses
Galerina vittaeformis	U	moist; specific details lacking			mosses
Gastroboletus imbellus	S		u-m		pinaceae
Gastroboletus ruber	U	well developed humus layer		OG	TSME

ROD Species Occurrence in the Coast Range

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Suspected (S): h = subalpine & alpine

Gastroboletes turbinatus	S	thick humus and abundant large coarse woody debris	l,m,h	OG	conifer
Gautieria otthii	R	ectomychorrizal with Pinaceae	m,h	mat-OG	mixed conifer
Glomus radiatum	S	moist coarse woody material	l,m,h	mat-OG	SESE, CHNO
Gomphus bonarii, B. clavatus, B. floccosus, B. kauffmanii	S	rich humus layer	l,m,h	OG	conifer
Grandinia microsporella	U	wood, humus, litter			
Gymnomyces sp. nov.#Trappe4703, 5576	S		mh		ABPR
Gymnopilus puntifolius	U	well decayed stumps and logs		LS	conifer

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
Suspected (S): h = subalpine & alpine

Gyromitra californica	U	decaying matter & rotten wood		mat	
Gyromitra esculenta	U	rotten wood		OG	
Gyromitra infula	U	decaying matter and rotten wood		mat	
Gyromitra melaleucoides	U	decaying matter and rotten wood			
Gyromitra montana (syn. G. gigas)	U	decaying matter & rotten wood		mat	
Hebeloma olympiana	U	habitat requirements not known			
Helvella compressa	U	riparian or wet	l,m	LS	
Helvella crassitunicata	U	riparian or wet	l,m	LS	
Helvella elastica	U	riparian or wet	l,m	LS	
Helvella maculata	U		l,m	LS	
Herbertus aduncus	S	foggy rocks and tree-trunks		OG	
Herbertus sakurali	S	foggy rocks in forests		OG	
Heterodermia sitchensis	U	unknown			
Hydnum repandum	P			LS	conifer and hardwood
Hydnum umbilicatum	S			LS	conifer and hardwood
Hydrothyria venosa	S	clear, cold streams	l,m	OG	
Hygomnia vittiata	U	unknown			
	U	habitat requirements not known			

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained FSEIS, was determined to be:

Present (P): documented
Remote possibility (R):
l = below transien
Highly probable (H):
Unknown (U):
m = transient snow zone
Suspected (S):
h = subalpine & alpine

Hygrophorus caeruleus Hygrophorus karstenii	U	habitat requirements not known				
Hygrophorus vernalis	U	habitat requirements not known				
Hypogymnia duplicata	R	foggy, coast & maritime sites	l		conifers	
Hypomyces luteovirens	U	fruit bodies of other fungi		LS		
Iwatsukella leucotricha	S	bark		OG		
Kurzia makinoana	S	shaded rotten wood &humic soil	l,m	OG		
Leptogium burnetiae var.hirsutum	S	riparian forest on older trees	l,m	OG	hardwood	
Leptogium cyanescens	S	riparian forest on older trees	l,m	OG		
Leptogium rivale	S		l,m	OG		
Leptogium saturninum	S	forests on older hardwood trees	l,m	OG		

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained

FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien

Highly probable (H): Unknown (U): m = transient snow zone

Suspected (S): h = subalpine & alpine

Leptogium teretiusculum	H	riparian forest on old hardwoods	l,m	OG		
Leucogaster citrinus	S	abundant legacy of coarse debris	l,m	mat-OG	PSME, TSHE, CACH	
Leucogaster microsporus	S	abundant legacy of coarse debris	m	OG	PSME	
Lobaria linita	S		l	OG	PSME, ACMA, ALRU	
Lobaria hallii	S	hardwoods/shrubs coastal forests	l,m	LS	conifers	
Lobaria oregana	H	open coastal forests		OG	conifers	
Lobaria pulmonaria	H	wet,hardwood forests swamps		OG		
Lobaria scrobiculata	H			OG>140		
Macowanites chlorinosmus	H	large coarse woody material	l	mat-OG	PISI, PSME, TSHE	
Macowanites mollis	R		l	mat-OG	PSME/Pinaceae?	
Martellia idahoensis	S		m,h	mat-OG	Abies, Pinaceae	
				mat-OG		
Microcalicium arenarium	S			OG		
Mycena hudsoniana	U	litter, humus or dead wood		LS	conifer	
Mycena lilacifolia	U	rotting stumps and logs		LS	conifer	

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ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
Suspected (S): h = subalpine & alpine

Mycena marginell	U	rotting stumps and logs		LS	conifer
Mycena monticola	U	litter, humus or dead wood		LS	conifer
Mycena overholtsii	U	rotting stumps and logs		LS	conifer
Mycena quinaultensis	U	litter, humus or dead wood		LS	conifer
Mycena tenax	U	litter, humus or dead wood		LS	conifer
Mycocalicium subtile	S			OG	
Mythicomyces corneipes	U	litter, humus or dead wood		LS	conifer
Neolentinus kauffmanii	S	only on logs or stumps of PISI		LS	PISI
Neournula pouchetii	S	conifer litter			THUJA/TSUGA
Nephroma bellum	H	open forest		OG	
Nephroma helveticum	H	coast & montane forests		OG	
Nephroma isidiosum	U	unknown			
Nephroma laevigatum	H	coastal forests	l	OG	
Nephroma occultum	S			OG>400	conifers & decidous
Nephroma parile	H	moist	l		conifers
Nephroma resupinatum	H	coast and montane shady forest	l,m	OG	PSME, TSHE
Octavianina macrospora	S			mat-OG	PISI, TSHE, PSME, SESE

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
Suspected (S): h = subalpine & alpine

Octavianina papyracea	S	mesic	l	mat-OG	
Octavianina papyracea	S	mesic	l	mat-OG	PISI, TSHE, PSME, SESE
Otidea leporina	S	fog belt	l	LS	conifer
Otidea onotica	S	duff in moist-wet forests	m,l	LS	conifer
Otidea smithii	S	duff in moist-wet forests	m,l	LS	conifer
Oxyporus nobilissimus	S	large stumps, snags, living trees;	m,l	OG	ABPR
Pannaria leucostictoides	H	open coastal forests	l	OG	
Pannaria mediterranea	S			OG>140	
Pannaria rubiginosa	S	bases of trees		mat	
Pannaria saubinetii	H			OG>140	
Peltigera pacifica	S			OG>140	
Peltigera collina	H	coast forests	l,m	OG	
Peltigera neckeri	H			OG>140	
Phaeocollybia ssp.	H		l,m		
Phellodon atratum	H			LS	conifers / hardwoods
Phlebia diffusa	U	wood, humus, litter			
Phlogoitis helvelloides	S	riparian zones/large woody debris			

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
Suspected (S): h = subalpine & alpine

					conifers
Pholiota albivelata	S	litter, humus or dead wood		LS	
					conifers
Phytoconis ericetorum	S	large woody debris in well lit forest altern. high/low moisture			Botryodina
Pilophorus nigricaulis	S	talus rock patches in forest with low fire frequency		OG	
Plagiochila satol					
Plagiochila satol	S	cliffs, rocks & conifer bark		OG	conifer
Plagiochila semidecurrens var.crumniana	S	foggy cliffs, bark & shaded thin soil over rock		OG	
Platismatia lacunosa	S	moist forest	l,m	OG	
Plectania melastoma	U	forest duff		LS-OG	conifer
Podostroma alutaceum	U	decayed wood fragments in duff		mat	conifer or mixed
Polyozellus multiplex	S	along intermittent streams/seeps		mat-OG	Picea, Abies
Polyporoletus sublividus	U	wood, humus, litter			
Postia rennyii	U	wood, humus, litter			
Pseudaleuria quinaultiana	S	wet	l	LS	conifer
Pseudocyphellaria anomala	H	coast forests	l,m	OG	
Pseudocyphellaria anthraspis	H	open forests	l,m	OG	conifer

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
Suspected (S): h = subalpine & alpine

Pseudocyphellaria crocata	H	trunks		OG>140		
Pseudocyphellaria rainierensis	S	boles		OG>200	PSME	
Ptilium californicum	S			OG	conifers	
Racomitrium aquaticum	R	rocky the stream banks(splash zone)		OG		
Ramalina pollinaria	S	coast forests on sandstone		mat-OG		
Ramaria sp.	S	litter, humus		mat-OG		
Rhizopogon brunneiniger	S	dry to moderate	l,m,h	mat-OG	Pinaceae	
Rhizopogon exiguus	S	abundant legacy of coarse wood		mat-OG	PSME, TSHE	
Rhizopogon flavofibrillosus	R		m	LS	Pinaceae	
Rhodocybe nitida	S	moist, deep humus & litter layer	l			
Rickenella setipes	U	moist; details of ecology lacking			mosses	
Russula mustelina	U	habitat requirements not known		LS		
Sarcodon fuscoindicum	S			LS	conifers / hardwoods	
Sarcodon imbricatus	S			LS	conifers / hardwoods	
Sarcosoma mexicana	S	coastal forests	m		conifers	

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained
FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien
Highly probable (H): Unknown (U): m = transient snow zone
Suspected (S): h = subalpine & alpine

Sarcosphaera eximia	U	chalky soils (European strain)			conifers & fagaceae
Scouleria marginata	S	splash zone of streams		OG	
Scytinostroma cf. galatinum	U				
Sparassis crispa	P	base of large trees	l,m	LS	PSME
Spathularia flavida		duff layer		mat	conifer
Stagnicola perplexa		litter, humus or dead wood		LS	conifer
Stenocybe clavata	S	high atmospheric humidity		OG	
Stenocybe major	S			OG	
Sticta arctica	S	coast forest rock outcrops		OG	
Sticta beauvoisii	S			OG>140	
Sticta fuliginosa	H	coast & moist forests	l	OG	conifer
Sticta limbata	H	coast forests	l,m	OG	
Tetraphis geniculata	S	moist rotting wood; shaded	l,m	OG	
Thaxterogaster sp. nov. #Trappe 4867, 6242	P	coarse woody debris in fog belt	l,m	mat-OG	PISI, TSME, PSME
Tholurna dissimilis	S	subalpine fog zone			TSME/ PSME
Tricholoma venenatum	S	diverse OG-forests/heavy humus		LS	conifers
Tritomaria exsectiformis	S	riparian moist shaded rocks	l,m,h	OG	

ROD Species Occurrence in the Coast Range

Occurrence information ,found in the column OC, was determined as follows: Elevation data, obtained FSEIS, was determined to be:

Present (P): documented Remote possibility (R): l = below transien

Highly probable (H): Unknown (U): m = transient snow zone

Suspected (S): h = subalpine & alpine

Tritomaria quinquedentata	S	moist shaded rocks	l,m,h	OG		
Tuber sp.nov.#Trappe 12493	S	coarse woody debris in fog belt	l,m	mat-OG	PISI, TSHE, PSME	
Tuber sp. nov. #Trappe 2302	S	coarse woody debris in fog belt	l,m	mat-OG	PISI, TSHE, PSME	
Tylopilus pseudoscaber	S	moist forest with coarse woody debris	l	OG	PISI	

APPENDIX 4: map 19) LSOG hab. goes here

APPENDIX 4: table 4, LSOG hab. goes here

Supplemental Wildlife Information

Part I. Wildlife Species of Concern

Many hundred, and possibly thousands of wildlife species (including vertebrates and invertebrates) may occur within the North Fork Alsea Watershed. Many of these species are considered to be regionally widespread, or at low risk from forest management activities. Still there are many species that may be significantly affected by forest management activities, and for which distribution and life history information is poorly known.   The Supplemental Environmental Impact Statement (SEIS) that was prepared for the Northwest Forest Plan (NFP), attempted to evaluate the viability of hundreds of plant and animal species that could be affected by forest management actions within the range of the spotted owl. The Record of Decision (ROD) for the NFP found that most of the wildlife species will be adequately protected by land use allocations and management directions set forth in the ROD. Still, dozens of wildlife species face viability concerns that were not sufficiently addressed by the new management direction.   Some of these species were considered in this analysis.

The Riparian Reserves (RR) established by the ROD, are considered a key component for the viability of many wildlife species.   This analysis did not evaluate the consequences of modifying the interim RR widths in this watershed, since adequate information was not available for species likely to be affected most by such actions. The evaluation of issues related to wildlife species in this watershed was focused on those species that appear in **Table J.1**. Terrestrial animals were included in this list if they met one of the following conditions:

- species that are listed, proposed, or a candidates for review under the Endangered Species Act (ESA), and are documented to occur, or suspected to occur, based on the presence of suitable habitat within the watershed.
- the regional viability of a species was deemed to be uncertain under the NFP (see ROD, Table C-3, as amended 12/94), and the species is reasonably likely to occur in the watershed due to the presence of suitable habitat.
- a species of local concern due to: (1) the current availability of habitat causing concern for local viability (e.g. amphibians, spotted owl, murrelet); (2) the increasing population trend and the economic significance of a species (i.e., elk and bear); or (3) the limited distribution of a species and the vulnerability of its habitat (i.e. unnamed blind beetle recently discovered in old-growth habitat on Prairie Peak).

Part II. Status of Spotted Owls, MarbledMurrelets, and their Habitats

The northern spotted owl (*Strix occidentalis caurina*) and the marbled murrelet (*Brachyramphus marmoratus*) are two species that have become listed as **threatened** under the federal Endangered Species Act (ESA) of 1973, as amended. Section 7 of the ESA requires that all federal agencies consult with U.S. Fish and Wildlife Service, prior to implementing actions that may affect a listed species. The information on owl and murrelet habitat conditions presented in **Table J.2** is set forth as a baseline to facilitate future consultation on projects that may affect owls and murrelets within the N.F. Alsea Watershed.

Using a complete habitat/cover type map created for the N.F. Alsea Watershed (see Part III below), all habitat types were assigned values that identified their current or potential importance as habitat for spotted owls and marbled murrelets. **Spotted owl habitat** was quantified as follows:

(1) **suitable habitat** used for nesting, roosting, and foraging (NRF), which generally includes conifer or mixed stands aged 110 years old or older.
(2) **suitable habitat** used primarily for roosting and foraging (RF) with limited nesting opportunities, which usually includes stands aged 80 to 110 years old.
(3) **dispersal habitat**, which includes young stands generally 40 to 70 years old which don't currently provide suitable NRF or RF habitat, but which allow for movement and provide continuity of forest canopy between stands.
(4) **non-suitable habitat** which includes young stands (usually less than 40 years old) and recent openings that are not currently suitable, but where vegetation or site potential is capable of developing into suitable habitat.
(5) **non-suitable habitat** which includes non-forest capable lands and other minor lands that have no potential of developing into habitat.

This habitat classification scheme for spotted owls was first developed during the planning process for Westside BLM RMPs (refer to USDI-BLM 1994). This habitat classification scheme was modified in this watershed specifically to allow for delineation of "non-habitat" into cover types that could potentially develop into dispersal habitat (code 4), and cover types that are not considered forest capable (code 5). For BLM lands, existing forest inventory data was easily translated into appropriate owl habitat codes. Whereas, non-BLM lands were coded based on aerial photo interpretation along with comparison with adjacent stands on BLM and limited field inspection. Using the data compiled from this spotted owl habitat analysis, **Table J.2** provides an estimate of "forest capable" lands (codes 1,2,3, and 4), and the current condition of suitable owl habitat (codes 1 and 2) and dispersal habitat (codes 1,2, and 3) on both federal and non-federal lands.

All habitat/cover types were also evaluated for their importance as **marbled murrelet habitat**
The initial criteria for identifying suitable murrelet habitat were also developed during the Westside BLM RMP planning process (see USDI-BLM 1994). All habitat/cover types were assigned to one of the following categories of murrelet habitat:

(1) **suitable habitat**, which included forest stands with an over story component of at least 110 years old, often composed of classic old-growth trees (>200 years old).
(2) **potential habitat**, which generally included stands 80 to 100 years old.
(3) **non-habitat**, including non-forest and young forest stands less than 80 years old.

In this analysis the existing BLM criteria for murrelet habitat were modified to allow for delineating what previously was referred to as "suitable murrelet habitat" into suitable and potential habitat. In this watershed, suitable habitat included older forest stands that currently have a high likelihood of providing the structural components required for nesting (e.g., large mossy limbs, mistletoe infestations, limb and bole deformities, multi-storied stand structure, and dense overhead crown cover). Whereas, potential habitat included stands that are marginally suitable, due to limited development of nesting structure. It is important to note that, while the suitability of potential habitat may be limited, these stands are likely to grow into better habitat in the next 25 years and thus, are often referred to as "recruitment habitat." Since limited

APPENDIX 4

field

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review of these habitats were attempted, a liberal assessment of suitable murrelet habitat was used in Table J.2, where both suitable and potential habitat (codes 1 and 2) are included in the tally of "suitable murrelet habitat"

Part III. Habitat/Cover Classification Process

A complete GIS habitat/cover type map of all federal and non-federal lands was compiled for the N.F. Alsea Watershed from existing data. Data from the BLM forest inventory served as the baseline for this map coverage. GIS data for Forest Service lands were also incorporated into this coverage. Non-federal lands were then digitized within this coverage, and habitat/cover types were interpreted based on inspection of recent aerial photographs (1993), or by comparison with known conditions on federal lands. Additional inference to non-federal habitat interpretation was obtained from recent satellite images (1993: 10 meter resolution SPOT imagery), and from a composite vegetation coverage of the Oregon Coast Range constructed from 1988 TM imagery for the Coastal Landscape Analysis and Modeling Study (CLAMS, unpublished data from the Remote Sensing Laboratory, Pacific Northwest Research Station, Corvallis, Oregon 1995).

Once the digitized polygons for all federal and non-federal lands were combined into a single map, five habitat related attributes were determined for each polygon in the map. **Habcode** was the first attribute to be interpreted for each newly digitized polygon (all non-BLM lands). For BLM lands this attribute was populated based on selection criteria using the baseline BLM forest stand attributes. The remaining four attributes were populated based on the value of Habcode (see **Table J.3**). The **Vegclass** attribute was created to allow for a condensed presentation of Habcodes. This attribute allowed for representation of the major vegetation types in a manageable number of classes that are comparable to vegetation classes typically identified in other watershed analyses. The **Eclass** attribute was created to qualify the edge contrast between late seral/old growth (LS/OG) habitat and all other habitats (i.e.; 0= no contrast from LS/OG, 1= moderate contrast, 2= high contrast). Eclass was also populated based on Habcode. However, some habitat patches were manually assigned an Eclass based on inspection of their spatial configuration with respect to LS/OG patches. For instance, small (< 2.5 acres) narrow shaped patches of moderate contrast forest, such as mature hardwoods, were occasionally assigned an Eclass of zero if they were totally enclosed by a large LS/OG patch. Eclass was used to model interior LS/OG conditions as delineated from edge effected LS/OG. In the model used for this analysis, "edge effects" extended 400 feet in from high contrast edges, and 200 feet in from moderate contrast edges. The **SHB** and **MMH** attributes were created to represent spotted owl and marbled murrelet habitat respectively. Criteria for assigning values to these attributes is described in Part II above. For the completed map coverage, the above five attributes were the only attributes that were common to all polygons on BLM, Forest Service, and non-federal lands.

Table J.1. Terrestrial Wildlife Species of Concern within the N.F. Alsea Watershed, 9/95.

Group/Species	Federal Status	Occ.	Analysis Reason	Available Data	Impact Potential	Remark
amphibians						
tailed frog	C2	d	ESA,LC	poor	H	
northern red-legged frog	C2	d	ESA,LC	poor	M	
southern torrent salamander	C2	d	ESA,LC	poor	H	
reptiles						
northwestern pond turtle	C2	p	ESA	poor	L	potential for introduction
birds						
northern spotted owl	FT	d	ESA,LC	good	H	well surveyed since 1986
marbled murrelet	FT	d	ESA,LC	fair	H	limited surveys
bald eagle	FT	d	ESA	fair	L	winter transient
northern goshawk	C2	?	ESA	fair	?	2 nests found 1995, Lane Co.
harlequin duck	C2	?	ESA	poor	?	1 nest record in Coast Range
mammals						
red tree vole	-	s	SAS	poor	H	
white-footed vole	C2	d	ESA	poor	?	collected at Alsea Falls
Pacific fisher	C2	?	ESA	poor	?	
long-eared myotis	C2	s	ESA	poor	?	
long-legged myotis	C2	s	ESA	poor	?	
Yuma myotis	C2	s	ESA	poor	?	
fringe-tailed bat	-	s	SAS	poor	?	
silver-haired bat	-	s	SAS	poor	?	
Roosevelt elk	-	d	LC	good	H	damage complaints
black bear	-	d	LC	fair	H	damage complaints
invertebrates - molluscs						
Deroceras hesperium	-	s	SAS	poor	?	evening field slug
Megomphix hemphilli	-	s	SAS	poor	?	Oregon megomphix snail
Prophysaon coeruleum	-	s	SAS	poor	?	blue-grey tail dropper
Prophysaon dubium	-	s	SAS	poor	?	papillose tail-dropper
invertebrates - arthropods						
Agonum belleri	C2	?	ESA	poor	?	Beller's ground beetle
Pterostichus rothi	C2	?	ESA	poor	?	Roth's blind beetle, MP
Anillodes sp.	-	s	LC	poor	H	unamed blind beetle
invertebrates - oligochaetes	C2	s	ESA	poor	?	Oregon giant earthworm
Megascolides macelfreshi						

Federal Status: FT= federally threatened, C2= federal candidate for listing.
Occurrence (Occ.): d= documented to occur in watershed, s= suspected to occur due to suitable habitat, p= potential for introduction within historic range, ?= likelihood of occurrence is unknown.
Analysis Reason: ESA= concern for recovering or avoiding listing under the Endangered Species Act, SAS= special attention species likely to occur in watershed, LC= local concern for existing habitat conditions in watershed.
Available Data: assessment of the quality of information available to allow for analyzing potential impacts to a species within the watershed, described as: poor, fair, or good.
Impact Potential: the potential of federal forest management actions to impact the viability of a species within this watershed, described as: (H)igh, (M)oderate, (L)ow, or Unknown (?).

Table J.2. Status of owls, murrelets, and their habitat with the N.F. Alsea Watershed, 11/95.

	Total	**Total Protected** [1]	**Total Unprotected** [1]

Habitat and Site Status	Acreage/Sites	(% of Total)	(% of Total)
Total Area within watershed (Acres)	41868	-	-
Total Forest Capable Acres in watershed [2] Federal forest capable acres Non-federal forest capable acres	39750 20775 18975	19205 (48%) 19205 (92%) 0 (0%)	20545 (52%) 1570 (8%) 18975 (100%)
Suitable Spotted Owl Habitat in watershed [3] Federal suitable owl habitat Non-federal suitable owl habitat [4]	7450 6128 1322	6089 (82%) 6089 (99%) 0 (0%)	1361 (18%) 39 (1%) 1322 (100%)
Dispersal Habitat within the watershed. [5] Federal dispersal habitat Non-federal dispersal habitat [4]	21792 12744 9048	12074 (55%) 12074 (94%) 0 (0%)	9718 (45%) 670 (6%) 9048 (100%)
Total Spotted Owl Sites within the watershed [6] Sites with habitat: 30 to 40% Sites with habitat: 20 to 30% Sites with habitat: less than 20%	3 2 0 1	3 (100%) 2 (100%) - 1 (100%)	0 0 - 0
Suitable Murrelet Habitat with the watershed [3] Federal suitable habitat Non-federal suitable habitat [4]	7703 6381 1322	6346 (82%) 6346 (99%) 0 (0%)	1357 (18%) 35 (1%) 1322 (100%)
Number of Survey Stations in watershed [7] Stations with detections Stations with NO detections	17 5 12	- - -	- - -
Number of Murrelet Activity Areas. [8] Occupied Murrelet Sites Sites with Presence of Murrelets	4 2 2	4 (100%) 2 (100%) 2 (100%)	0 0 0

1). Protected areas refers to those acres/sites lying within LSR or Riparian Reserve allocations on federal lands. For this reason all non-federal acres/sites were considered unprotected. Percentages add up horizontally .

2). Forest capable acres are those acres capable of producing forested habitat. Agricultural lands, non-forest habitats (e.g., exposed rock, persistent grass lands, open water), and occupied lands (e.g., residential, highways, quarries) were considered non-forest capable lands.

3). Forest conditions corresponding to suitable owl and murrelet habitat are defined in accompanying text and presented in Table J.3.

4). Owl and murrelet habitat conditions on non-Federal lands were quantified by interpretation of 1993 aerial photographs. Only limited field verification was attempted on non-federal lands.

5). Dispersal habitat totals include both suitable and "dispersal only" habitat (types 1, 2, and 3 3 described in text).

6). Includes owl sites known for all ownerships within watershed. The habitat within 1.5 miles of each owl site was evaluated by tallying the percent all lands (federal and non-federal) within the circle (about 4500 acres) that were composed of suitable owl habitat (types 1 and 2 described in text).

7). Includes only BLM survey stations with 4 or more surveys per station. All suitable habitat surrounding stations with detections is protected within LSR allocations on BLM and FS lands.

8). Includes only surveyed areas on federal lands within the watershed. Occupation and Presence of murrelets was based on surveys meeting protocol described by the Pacific Seabird Group (Ralph et al. 1994).

Table J.3. Comparison of habitat/cover types used in N.F. Alsea watershed analysis, 11/95.

Cover Types/Habitat Descriptions	Habcode	Vegclass	Eclass	SHB	MMH
Open Cover Types					
Residential settlement, pavement, quarry, highway	01	0	2	5	N
Bare agricultural land, disturbed ground in valley	02	1	2	5	N
bottom	03	1	2	4	N
Upland - recent clear-cut, slash, debris	04	1	2	5	N
Upland - exposed rock					
Grass/Forb					
Agricultural crops, grasslands, valley bottom forb land	11	2	2	5	N
Upland - persistent or natural grassland	12	2	2	5	N
Upland - recent clear-cut, regeneration harvest	13	2	2	4	N
Shrub/Open Sapling					
Agricultural or valley shrublands	21	3	2	5	N
Persistent or natural shrub patches	22	3	2	5	N
Regenerating clear-cut, open sapling stage	23	3	2	4	N
Conifer Dominant Stands					
Early seral open/closed conifer (age 10 - 30)	31	4	2	4	N
Mid seral conifer stage (age 40 - 70)	32	5	1	3	N
Late successional stage I (age 80 - 120)	33	6	0	2	P
Late successional stage II (age 130 - 190)	34	7	0	1	S
Classic old growth (age 200+)	35	7	0	1	S
Hardwood/Conifer Mix					
Young mixed stands (age 10 - 40)	41	4	2	4	N
Mature mixed stands (age 50 - 90)	42	5	1	3	P
Over mature mixed (age 100+)	43	5	0	2	S
Hardwood Dominant					
Young closed hardwoods (age 10 - 40)	51	8	2	4	N
Mature hardwoods (age 50 - 90)	52	9	1	3	N
Over mature hardwoods (age 100+)	53	9	1	3	N
Oak/madrone dominant	54	8	2	3	N
Orchards	55	8	2	5	N
Open Water	99	0	2	5	N

APPENDIX 5 = 1 map (zones of influence)

Potential Road and Culverts Projects

EARLY LOGGING ZONE

Road No.	Recommendation	Priority
13-7-11	-Decommission to close north portion of road (2.50 miles) -Remove or reduce 6 fills / culverts and restore natural drainage	High
13-7-13.2	-Vegetated road with motorcycle use -Construct earthberm or decommission to close 0.14 mile of road	Medium
13-7-15, E-J	-Replace 5 undersized culverts	High **[7]

(* *) Flood damage projects warranting highest

	-Replace 3 deep log fills with culverts	
13-7-21, C&E 13-7-22	-Vegetated roads with motorcycle use -Construct earthberm or decommission to close 0.74 mile of road	Low
13-7-21.1, B-C	-Construct earthberm or decommission to close 1.29 miles of road	Medium
13-7-23, A2-B	-Reconstruct 0.55 mile of road to eliminate erosion potential	High **
13-7-23.1, A	-Decommission to close 0.51 mile of road	High
13-7-23.1, B2-C	-Construct earthberm to temporarily close 0.83 mile of vegetated road	Medium
13-7-23.3	-Replace 1 undersized culvert	Medium
13-7-23.4, A	-Decommission and restore drainage to 0.72 mile of road	High **
13-7-23.4, B	-Replace 1 deteriorated culvert	Medium
13-7-23.5 13-7-23.6	-Construct earthberm to temporarily close 0.78 mile of road	Low
13-7-26	-Construct earthberm to close 0.53 mile of road	Low
13-7-27.1	-Replace 1 damaged culvert	Medium
13-7-27.2	-Replace 1 damaged culvert	Medium

Road No.	Recommendation	Priority
13-7-28.3	-Restore adequate ditches to 0.40 mile of road	Medium
13-7-29, D	-Need release from private land owner -Decommission to close 1.16 miles of road -Remove 3 culverts and restore natural drainage -Outslope and waterbar	Medium
13-7-33	-Construct earthberm to close 0.15 mile of vegetated road	Low
13-7-33.1	-Replace 2 damaged / undersized culverts -Stabilize 0.30 mile of steep ravelling cut slopes	Medium
13-7-33.2	-Construct earthberm or decommission to close 0.14 mile of road	High
13-7-35	-Decommission to close road (0.98 mile) -Remove or reduce 4 fills / culverts and restore natural drainage	High
14-7-5.1, C&D	-Replace 4 undersized culverts -Install 1 additional new culvert	Medium
14-7-5.1, E	-Construct earthberm to close 0.78 mile of road -Outslope and construct drain dips -Remove or reduce 3 fills / culverts and restore natural drainage	Medium

TOTALS

Additional culverts needed = 1
Stream diversion potential culverts = 21
Partially blocked culverts = 20
Potentially undersized culverts = 11

Culverts / Fills to remove or reduce = 16
Potential roads to close = 16

APPENDIX 6

RUGGED ZONE

Potential Project Areas:

Road No.	Recommendation	Priority
12-7-30, No.1 NE1/4SE1/4	-Unnumbered spur road -Construct earthberm to close 0.01 mile of road	Low
12-7-30, No.2 NE1/4SE1/4	-Unnumbered spur road -Construct earthberm to close 0.01 mile of road	Low
12-7-31	-Construct earthberm to close 0.79 mile of vegetated road	Low
12-7-32	-Powerline access -Install gate to limit access to 1.25 miles of road -Outslope road and install drain dips -Remove or reduce 3 fills / culverts and restore natural drainage	High
12-7-32 No.1	-Unnumbered spur road for powerline access -Outslope road and install drain dips	High
12-7-32.1, 12-7-32.2, 12-7-32.4	-Powerline access to M.P. 0.50 of road 12-7-32.1 -Potential recreation trail area -Decommission and / or convert 1.64 miles of road to trail -Replace or remove 2 deteriorating undersized culverts -Remove or reduce 16 culverts / fills	High
12-7-32.3	-Construct earthberm to close 0.45 mile of road -Outslope and install drain dips -Remove or reduce 1 culvert / fill	Medium
12-7-33	-Powerline access -Maintain surface on 1.57 miles of road to force runoff into ditches	Medium
12-7-33, No.1	-Unnumbered spur road - Decommission to close 0.08 mile of road	High
12-7-33.1	-Construct earthberm or decommission to close 0.45 mile of road -Construct waterbars	High
12-7-33.2	-Construct earthberm to close 0.06 mile of road	Low

Road No.	Recommendation	Priority
12-7-34	-Rock quarry location -Rechannel surface runoff to a stable location	High **
13-7-4, B, D-I	-Replace 10 damaged / poorly installed / undersized culverts -Maintain surface on 2.94 miles of road to force runoff into ditches -Large rock slide at M.P. 4.13 blocking access to 2.28 miles of BLM and Private road	Medium
13-7-5	-Construct earthberm to close 0.70 mile of road -Outslope and install drain dips	Low
13-7-5.1	-Construct earthberm to close 0.33 mile of road -Outslope and install drain dips	Low

13-7-5.2 13-7-5.5	-Construct earthberm or decommission to close 1.22 miles of road -Remove or reduce 1 culvert / fill -Construct waterbars and restore natural drainage	High **
13-7-5.3	-Construct earthberm to close 0.28 mile of road -Outslope and install drain dips -Remove or reduce 1 culvert / fill and restore natural drainage	Low
13-7-7 13-7-7.1	-Construct earthberm to close 1.31 miles of road -Outslope and install drain dips	Medium
13-7-10, A-C,E, G-H,K,N-O,Q-R, S2,T	-Replace 20 damaged / undersized culverts -Install 3 new culverts -Restore ditches to improve drainage	Medium **
13-7-18, B1-B2, D1-D2	-Replace 13 undersized culverts -Correct drainage problems -Install 2 new culverts	High **
13-7-18, D3-E	-Replace 1 undersized culvert -Replace 1 deteriorating log fill with a culvert	High **
13-7-31	-Construct earthberm or decommission to close 0.68 mile of road	Medium

Road No.	Recommendation	Priority
13-7-31.2	-Construct earthberm or decommission to close 0.50 mile of road	Medium
13-8-10.4, B	-Beaver problem area -Replace 1 undersized culvert	Low
13-8-10.4, D	-Construct earthberm to close 0.50 mile of road	Low
13-8-13	-Construct earthberm or decommission to close 0.19 mile of road	Low
13-8-13.1	-Construct earthberm or decommission to close 0.17 mile of road	Low
13-8-14	-Construct earthberm to close 0.48 mile of road	Low
13-8-15	-Place riprap to correct outlet erosion at 5 culverts	High
13-8-15, No.1	-Unnumbered spur road -Construct earthberm or decommission to close 0.06 mile of road	Low
13-8-15.1 13-8-15.2	-Construct earthberm or decommission to close 0.54 mile of road	Medium
13-8-15.3, B	-Replace 1 undersized and poorly installed culvert	Low
13-8-15.4	-Construct earthberm or decommission to close 0.33 mile of road	Low
13-8-21	-Construct earthberm or decommission to close 0.12 mile of road	Low
13-8-22,B	-Construct earthberm or decommission to close 0.57 mile of road	Low
13-8-23.1, A-E	-Replace 8 damaged / undersized culverts -Restore proper drainage patterns	High

13-8-23.1, G4-H	-Construct earthberm to close 2.20 miles of road	Low
13-8-23.2	-Surface 0.49 mile of road with crushed rock	Low
13-8-23.4	-Construct earthberm or decommission to close 0.44 mile of road	Medium

Road No.	**Recommendation**	**Priority**
13-8-23.5 (part)	-Construct earthberm or decommission to close 0.28 mile of road	Low
13-8-23.6	-Construct earthberm or decommission to close 0.28 mile of road	Low
13-8-23.7, B	-Construct earthberm or decommission to close 0.26 mile of road	Medium
13-8-25.1	-Decommission to close 0.24 mile of road	Medium
13-8-25.3	-Construct earthberm or decommission to close 0.25 mile of road	Medium
13-8-25.4	-Decommission to close 0.44 mile of road	Medium
14-8-2,I	-Construct earthberm or decommission to close 0.44 mile of road	Medium

Totals

Additional culverts needed = 5
Stream diversion potential culverts = 37
Partially blocked culverts = 36
Potentially undersized culverts = 56
Culverts / Fills to remove or reduce = 24
Potential roads to close = 38

Upper Basin Zone

Potential Project Areas:

Road No.	Recommendation	Priority
12-8-19, H-O	-Replace 12 deteriorated / undersized culverts	High **
12-8-25, No.1	-Unnumbered spur road -Construct earthberm to close 0.25 mile of road	Low
12-8-25.3	-Construct earthberm to close 0.06 mile of road	Low
12-8-25.4	-Construct earthberm to close 0.22 mile of road -Outslope and install drain dips	Low
12-8-28.4	-Construct earthberm at property line to close 0.15 mile of road	Low
12-8-32.2, 12-8-33.1, 12-8-33.3	-Construct earthberm to close 0.62 mile of road	Low
12-8-33, A	-Replace 2 undersized culverts -Place riprap at outlet of 1 culvert	Low
12-8-33, E	-Construct earthberm to close 0.24 mile of road	Low
12-8-33.2	-Construct earthberm to close 0.11 mile of road	Low
12-8-34	-Replace 4 deteriorated / undersized culverts	High **
12-8-34.3	-Construct earthberm to close 0.16 mile of road	Low
12-8-35.1, 12-8-35.5	-Vegetated road into wetland area -Construct earthberm to close 0.47 mile of road	Medium
12-8-35.2, B	-Existing vegetated road -Construct earthberm to close 0.33 mile of road	Low
12-8-35.3	-Replace 3 deteriorated / damaged / undersized culverts	Medium
12-8-35.4	-Existing vegetated road -Construct earthberm to close 0.20 mile of road	Low

	Recommendation	Priority
12-8-35.6	-Construct earthberm to close 0.53 mile of road -Outslope and install drain dips -Remove or reduce 1 culvert / fill -Waterbar additional 0.24 mile of dirt road	Medium
12-8-35.8	-Construct earthberm to close 0.13 mile of road	Low
13-7-10, W-AA	-Replace 2 damaged / undersized culverts -Restore washed out stream channel to natural -Construct earthberms on both sides of stream crossing	Medium
13-8-1	-Replace 4 damaged / undersized culverts	Medium
13-8-1, No.1	-Construct earthberm to close 0.06 mile of road	Low
13-8-1.3	-Outslope and install drain dips to 0.69 mile of road -Remove or reduce 3 culverts / fills	Medium

13-8-1.4	-Outslope and install drain dips to 0.87 mile of road -Remove or reduce 1 culvert / fill	Medium
13-8-2, B	-Replace 2 undersized culverts	Low
13-8-2.2	-Construct earthberm to close 0.34 mile of road -Remove or reduce 1 culvert / fill -Restore natural drainage	Medium
13-8-2.4	-Construct earthberm to close 0.10 mile of road	Low
13-8-3.2	-Construct earthberm to close 0.43 mile of road -Outslope and install drain dips	Low
13-8-3.4	-Construct earthberm to close 0.29 mile of road -Outslope and install drain dips	Low
13-8-5.1	-Construct earthberm to close 0.09 mile of road	Low

Road No.	Recommendation	Priority
13-8-5.2	-Construct earthberm to close 0.29 mile of road -Outslope and install drain dips	Low
13-8-5.4	-Construct earthberm to close 0.18 mile of road	Low
13-8-5.5	-Construct earthberm to close 0.27 mile of road -Outslope and install drain dips	Low
13-8-5.6	-Construct earthberm to close 0.35 mile of road -Outslope and install drain dips	Low
13-8-8.2	-Construct earthberm to close 0.30 mile of road	Low
13-8-8.5	-Construct earthberm to close 0.08 mile of road	Low
13-8-9.1	-Construct earthberm to close 1.00 mile of road -Outslope and install drain dips	Medium
13-8-9.2, 13-8-9.3	-Construct earthberm to close 0.54 mile of road -Outslope and install drain dips	Medium
13-8-9.5	-Construct earthberm to close 0.40 mile of road	Low
13-8-9.6	-Construct earthberm to close 0.03 mile of road	Low
13-8-11	-Construct earthberm to close 0.13 mile of road	Low
13-8-11.1	-Construct earthberm to close 0.16 mile of road	Low
13-8-11.2	-Construct earthberm to close 0.47 mile of road	Low
13-8-11.3	-Construct earthberm to close 0.10 mile of road	Low
13-8-12.2, B-F 13-8-1.1, 13-8-1.2	-Construct earthberms at beginning and end of BLM property to close 1.93 miles of road -Remove or reduce 5 culverts / fills	Medium
13-8-12.3, C-F	-Construct earthberm to close 1.68 miles of road -Outslope and install drain dips -Remove or reduce 3 culverts / fills -Restore natural drainage	Low

Road No.	Recommendation	Priority
13-8-12.7	-Construct earthberm to close 0.40 mile of road -Outslope and install drain dips	Low
13-8-14.1	-Construct earthberm to close 0.20 mile of road -Outslope and install drain dips	Low
13-8-14.2, B	-Construct earthberm to close 0.12 mile of road -Outslope and install drain dips	Low

<u>Totals</u>

Stream diversion potential culverts = 29
Partially blocked culverts = 30
Potentially undersized culverts = 31
Culverts / Fills to remove or reduce = 14
Potential roads to close = 46

The “ Valley Zone” has few roads which most are gated to provide only limited access. There are no recommendations to any BLM roads in this zone.

Roads-to-Trails Recommendations

The proposed high value loop-trails and facilities in the N. F. Alsea watershed are confined to public lands. The proposed Corvallis-to-the-Sea Trail does include some primitive gravel public roads that are adjacent to private lands, but these roads have exclusive perpetual easements which include access rights for the public.

The following overgrown forest roads could be incorporated into these trails

Corvallis-to-the-Sea Trail

BLM roads 12-8-19 and 13-9-23.1

Circumpeak Trail

3000-16 Shoutpouch, Rock Creek watershed*
12-7-19 Shoutpouch, Rock Creek watershed*
FS 2005, Rock Creek watershed*
BLM road 12-7-30.2 (overgrown), Big Elk watershed

* USFS land; this watershed is due to be analyzed in 1997.

Parker Ridge Trail

12-7-30.1
12-7-31 (overgrown)
12-7-28.1 (overgrown)
12-7-28 (overgrown)
12-7-32 (overgrown)
12-7-32.1 (overgrown)

North Fork Alsea River Trail

13-7-10 (in Secs. 1, 12, and 13), Segments N and O
13-8-19 (in Secs. 1 and 12)
13-8-12.1, Segment B

CITIZEN INTERVIEWS

In the beginning of this watershed analysis process, a news release which invited public input was sent to three local newspapers, and questionnaires were sent at random to landowners who live in the watershed as well as to executives of timber companies and officials of other land management agencies who might be particularly interested in this area.

The citizen comments are given below, listed under the three sets of questions from the questionnaire. The comments are numbered (in no particular order), and set off by quotation marks; the watershed analysis team's response follows immediately after.

A. What do you see as the most important issues in this watershed ? What do you think needs to be done to resolve these issues?

1. " Littering along water course. Resolve with education, signs, etc.."

   BLM discourages littering anywhere on its lands. Practices to discourage littering range from public education (fairs, signs, etc.) to levying penalties and fines in criminal situations. BLM is open to suggestions to help reduce this problem on its lands.

2. " Maintaining water quality - improving stream side habitat - encourage private landowners to participate in stream side enhancement projects. Provide incentives such as tax credits exemptions for participating landowners."

   Protection and improvement of riparian habitat is a central focal point of the Northwest Forest Plan. All streams will be protected with riparian buffers of varying widths depending on whether fish are present or not. The Salem District is actively working on stream enhancement projects and seeks to cooperate with adjacent land owners where applicable. Providing incentives, such as suggested in this comment, would require legislative action by either Congress or the state legislature.

3. " It is great concern to us the continued practice of herbicide spraying along the river and its creek system. Aerial spraying puts the watershed at great risk. We live on a creek which crosses the Alsea Hwy. and feeds into the N. Fork. Road spray crews have repeatedly sprayed the creek in their yearly spring weed attack. Agricultural spraying along the river also occurs regularly."

   In 1982, the BLM and the USFS were enjoined from using herbicides until an Environmental Impact Statement (EIS) was completed. Findings from the EIS moved both agencies to stop using herbicides in the control of competing vegetation on federal lands. The BLM has not used herbicides since, and there are no provisions in the Resource Management Plan for their reintroduction. The Oregon departments of Forestry and Environmental Quality, and various other state and Federal agencies regulate the use of herbicides by private land owners.

4. " Set asides along feeder streams - larger than in the past, to reduce sedimentation & siltation of streams. Stream bed restoration projects."

   See response to comment 2 above.

APPENDIX 7

APPENDIX 7

5. “Harvest timber, including clear-cut harvesting, to maintain a wide diversity of habitat for big and small game, as well as enhancing the economic well being of Benton County and surrounding communities.”

Timber production and harvest are listed as goals in the Northwest Forest Plan and the District’s Resource Management Plan. Future clearcut units will have a different appearance from the traditional clearcut in that more trees and snags will be reserved and left on the site for biodiversity needs. BLM understands the desire to enhance the economy of surrounding communities and will do so within the constraints of laws and regulations.

6. “I believe the Alsea River is generally in good shape and should largely be left alone. My feeling is that the main threat to this area is perhaps the Federal Government.. Itself. Basically my answer is: ‘Don’t try to fix what isn’t broken.’ Do not impose upon nor impact upon private property rights or spoil our natural area.”

The BLM does not have jurisdiction over private water or property rights, and therefore, does not regulate private property along the river.

7. “The most important issue is to enhance water quality and quantity in the North Fork Alsea river. To resolve this issue there should be large buffer zones along Class I and Class II streams; clear cutting should be prohibited.”

Under the Northwest Forest Plan and the District’s RMP, all streams on federal land will have substantial vegetative buffers maintained along them. On state and privately held land, streams will have buffer requirements as determined by the Oregon State Practices Act. Although these buffers are considerably less extensive than those on federal lands, they are an improvement over past practices and landowners do have the option of increasing the width of the stream buffers. Clearcutting will not be prohibited on federal lands. Future final harvest units will be structured to maintain a significant number of live and dead standing and down trees to maintain forest health and leave a legacy of the previous stand.

8. “This watershed should continue to produce timber for our lumber needs. Small 10 - 40 acre clear cuts with selective thinning where practical. This would provide for deer, elk & owls, plus protect our waters.”

The Northwest Forest Plan and the Salem District’s RMP direct us to manage for ecosystem values within the watershed. This includes the establishment of LSRs and Riparian Reserves. Some lands are designated for the production of timber harvest; however, provisions for coarse woody debris, green tree and snag retention, and riparian buffers will be emphasized, along with retention of old-growth fragments in watersheds where little remains.

9. “Protection of water quality, preserve biodiversity, protect wildlife, promote recreational activities, and reduce illegal activities such as drug operations and poaching while at the same time produce quality wood for profit.”

The Northwest Forest Plan and the Salem Districts RMP requires ecosystem management on federal lands. Ecosystem management is a system which attempts to attain many of the natural resource objectives listed in the comment. Plans for future developed recreational opportunities are addressed in the RMP. Restriction of illegal activities on federal land is a regular part of BLM and other agencies' law enforcement programs.

10. "The best thing you can do is to leave it alone! We need ways to save Government finance not (make work) projects! It appears that there is sufficient management effort now at all levels. Continue to use the available resources as needed."

    The Northwest Forest Plan directs federal agencies to conduct watershed analysis prior to any projects within a watershed, including timber harvest operations, road construction or any number of other activities. The purpose of watershed analysis is to investigate and document an ecological understanding of the terrestrial, aquatic and human attributes of the North Fork Alsea watershed, and its functions, processes, past conditions and future conditions. The analysis will identify data gaps, management opportunities and possible restoration needs.

11. "I am not familiar with any problems on the watershed in question. My main concern as landowner or future landowner in the area is that the government agencies involved do not overstep their bounds, that is hold to the statement, in the letter from BLM, number 7000(085.0), 'The watershed analysis process is not intended, nor will it be used to dictate, influence or judge management direction on non-federal owned lands.'"

    Watershed analysis does not dictate management direction on non-federal owned lands. Watershed analysis attempts to analyze the existing conditions of private lands, by use of satellite imagery or other techniques, in order for the management agencies to better understand processes within the watersheds. Proposed projects forthcoming from this analysis focus on federal lands and have largely emphasized restoration of large conifers in riparian zones, closure or improvement of problem road segments, and control of major sediment sources.

12. "Road inventories (all classes). Drive or walk all roads, inventory differences, have 'soils team' review listed problem areas and make recommendations."

    Transportation management plans and objectives will eventually be developed for all the federally controlled roads in the Salem District. Road closures, obliterations and maintenance are driven by issues and objectives for protection of resources such as wildlife and water quality. This watershed analysis includes an inventory of roads with recommendations for their treatment by an interdisciplinary team of resource specialists.

13. "This watershed is part of the larger ecosystem. We are entering a new and historic era wherein every decision we make must take into account the welfare of the entire planet and all its inhabitants -- plants and animal alike and the non-living resources."

    We recognize that individual watershed analysis are an aggregate part of river basin analyses, which are, in turn, part of provincial watershed analyses. The findings of individual watershed analysis include a description of resource needs, capabilities, opportunities and range of natural variability within the watershed. The focus of watershed analysis will be on collection and compilation of information about the watershed that is essential for making sound management decisions, I. e., it will be an analytical, not decision-making, process.

14. “Wise use of its resources, e. g. timber, water and wildlife.”

    See response to comment ??.

    “The ESA has to be changed to include Humans as part of the nature.”

    The BLM has no authority to change or modify Congressional statutes or regulatory laws. It is our understanding, however, that there is an effort within Congress to revise the ESA recognizing the human element as part of nature.

    “A total shut down of renewable resources such as timber is wrong! With no federal wood, private landowners are clear cutting most of their land which is located in bottom ground next to and including streams and rivers. This creates a bad situation for quality water and fish habitat.”

    The Northwest Forest Plan calls for an “sustainable economy and a sustainable environment”. Although the NFP reduces the amount of federal timber available for harvest, it does provide for a portion of federal timber to be offered for sale. Cumulative effects of private landowner operations were considered in the development of the NFP.

15. “How does this project affect my water rights? I own to the center of the N. F. River (ground under the river) thus paying taxes on it.”

    This analysis does not affect your water rights as a private landowner.

    “ These issues are fine the way they are now, leave it alone.”

    Although watershed analysis considers the environmental condition of all the land within the watershed boundaries, it will not be used to dictate, influence or judge management on non-federal lands. Current science indicates that the Northwest old-growth forest ecosystem is not in fine shape and restoration efforts are warranted.

16. “Restoration of native anadromous fishes. Continue limiting catch of Coho and cutthroat trout, greatly reduce production of the N. F.. hatchery, have a minimum low flow on the Alsea river, riparian and stream habitat improvement.”

    Watershed analysis is a process used to determine how proposed land management activities will meet Aquatic Conservation Strategies. Aquatic Conservation Strategies, part of the Northwest Forest Plan, were developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on federal lands. The strategy would protect anadromous fish habitat. Other state and federal agencies that influence seasons, catch limits and administer fish hatcheries are members of the team conducting watershed analysis.

17. “Conserve any old growth that remains and let stand, any 2nd growth forests until yield can be achieved. Example, a local landowner recently clear cut a large section alongside the scenic Alsea

river between Honeygrove RD. and Clemens Park road that was far too young. They helicopter logged because of steepness, and small size of trees, the site is extremely ugly and gives forestry a bad name."

Land use allocations within the watershed analysis boundaries were defined for us in the Northwest Forest Plan. Approximately 75% of the federal ownership within the watershed has been designated as Late Successional Reserves. The remaining 25% will be managed for timber harvest and other silvicultural activities. Private landowner operations are governed by the Forest Practices Act and administered by the Oregon Department of Forestry.

B. Are there any specific locations within this watershed of particular concern to you? What are those areas and what are your concerns?

1. " I live on Hayden Creek and have noticed there are no migratory fish spawning in the creek. According to some older inhabitants of the Alsea Valley, virtually all of the small feeder creeks were used by salmon as spawning grounds."

   Migratory fish patterns have been altered in the NF Alsea watershed by dam construction (e. g., the NF Alsea River above the fish hatchery) and by road construction with associated culvert emplacements. There are also some natural barriers such as waterfalls which block fish. The number of fish returning to streams to spawn is highly variable and dependent on many conditions such as the water year, ocean condition, etc. Populations of salmon have been depressed in recent years due to a variety of interacting factors.

2. " There is a massive, incredibly steep clearcut across the road from us, directly above the North Fork. Spraying, runoff, erosion all happen here and wreak havoc on the river. Local farmers who own river front property also spray. The damage done to our N. Fork river on a yearly basis is shortsighted."

   We are unsure if the clearcut referred to is on private lands. If it is, the Oregon Forest Practices Act regulates harvesting activities, and includes stipulations for such things as riparian zones and wildlife trees. Herbicide spraying is regulated by the Oregon Department of Environmental Quality.

3. " I live along Crooked Creek and have seen wild salmon here in the fall, a few at least. My main concern is to preserve and protect these streams to provide spawning grounds for these wild salmon."

   Much of Crooked Creek flows through private lands. Private logging activities along stream banks are regulated by the Oregon Department of Forestry, and measures to protect spawning salmon have been codified under the Oregon Forest Practices Act. Stream banks are additionally protected on federal lands by Riparian Reserves established under the Northwest Forest Plan.

4. " Do not place recreation facilities (i.e., trails, equestrian unloading sites, campgrounds) in such places that the people utilizing those facilities become a burden upon your neighbors."

The location of recreational facilities on public lands is preceded by a scoping of the issues. The public is encouraged to present their views on recreational proposals at public meetings and through the mail. Following scoping, an Environmental Analysis is required according to procedures established under the National Environmental Protection Act.

5. " I understand there is some talk about developing recreation areas near the fish hatchery and possibly at or around Mary's Peak. I do not agree with this as it will be harmful."

   The concern apparently involves the potential development of the Corvallis-to-the-Sea Trail. This proposal would include development of trails and camping locations. The proposal is currently under review by various governmental bodies and private landowners. See response to comment 4 (immediately above).

6. " The area above the North Fork fish hatchery needs special protection in order to facilitate the Oregon Department of Fish and Wildlife's plan to restore the wild run of native steelhead in this area."

   See response to comment number 8, section A.

7. " The river is in good shape. We don't need the added trash problem of a bicycle trail."

   As stated, proposed recreational development must consider environmental impacts during the Environmental Analysis process.

8. " I sometimes worry about people digging in Spencer Creek to make fishing/swimming holes, and pumping water off the creek all summer long."

   Modification of instream materials is regulated by the Oregon Division of State Lands and the U.S. Army Corps of Engineers. Water pumping is regulated by the Oregon Dept. of Water Resources.

9. "Monitor and identify areas of potential landslide and debris torrent problems in the watershed. Ban clearcutting in those areas."

   These areas have been identified by our soils scientist in the watershed analysis process. They have been mapped and future timber harvest and road construction operations will be avoided where necessary.

10. " Limit clearcuts to very small acreage."

    The Northwest Forest Plan limits the amount of land available for regeneration harvesting. These lands are part of the Matrix. These harvests must retain legacies of the previous stand in the form of standing live trees and downed wood. The size will be determined based on site prescriptions.

11. " Limit road building."

The Northwest Forest Plan greatly limits the construction of new roads and calls for the decommissioning of some existing roads. The watershed analysis process will identify opportunities for road management.

12. " Avoid forest operations that will result in siltation or logging debris contaminating small feeder streams or major streams in the watershed."

    See response to comment number 7, section A.

13. " Maintain an adequate vegetative buffer on all riparian management areas on the whole watershed."

    See response to comment number 7, section A.

14. " Investigate the feasibility of providing a fish ladder to aid anadromous fish to move upstream from the present dam on the N. F. Alsea above the fish hatchery. This might provide access to a mile or two of excellent gravel beds for spawning for these fish."

    The Oregon Dept. of Fish and Wildlife is proposing this action. Contact them for additional details.

15. " Acres of old construction practices could fail and go directly into the N. F. Alsea River."

    Areas that can be restored have been identified in the watershed analysis process. Some areas may be very difficult to restore and efforts may be more harmful than leaving the site alone.

16. " My concerns are that this watershed and all federal lands be managed by competent forests and wildlife biologists that can work together for healthy fish, wildlife and human habitat."

    The Northwest Forest Plan requires that federal agencies work in concert to assure that the plan functions as designed.

17. " I am concerned about the Clemens Park area and how it affects me and my land."

    We assume that your concerns are related to human activities associated with use of that park (e. g., littering, noise, etc.). Benton County may address some of your concerns.

18. " In the past I have observed coho and steelhead trout in the upper reaches of Baker Creek, a tributary to Crooked Creek. Recently I have not seen any."

    See response to comment number 1, section B.

19. " We used to observe salmon in Honeygrove creek and now we don't see any."

    See response to comment number 1, section B.

C. **What kind of watershed restoration work would you like to see planned in the North Fork Alsea Watershed and specifically where would that work be?**

1. "I would like to see efforts focused on in-stream projects. Starting with the more major tributaries, such as the N. F.. Alsea and continuing later with the smaller creeks."

   See Chapter 6, the "Interpretation" chapter, for recommended restoration projects and their locations.

2. "Eliminate clear cutting near the watershed."

   Riparian Reserve widths have been applied to all BLM-administered lands; these widths are 220 or 440 feet, on both sides of the stream. (Widths are determined depending on whether fish are present or not.) The reserve widths may be modified depending on the outcome of watershed analysis, which will consider factors that include overall stream condition. On privately owned forest lands, riparian reserve widths are administered by the Oregon Department of Forestry, under the Forest Practices Act.

   "Eliminate herbicide spraying in the watershed."

   See response to comment number 3, section A.

   "Use draft horses for in stream restoration work."

   It is the BLM's policy to consider all resources, draft horses included, when analyzing proposed projects for environmental and economic feasibility.

   "Employ local people for these contracts."

   Recognizing the impacts of reduced harvest of timber from federal lands would have on local economies and the people employed in the timber industry, the federal government has allocated funds through the Northwest Economic Initiative (part of the Northwest Forest Plan) since 1994 for retraining and employment of displaced local forest workers. The BLM has used this money for the past two years on restoration projects much like the ones that are proposed in this watershed analysis.

3. "Stream bed restoration in places like Honeygrove Creek."

   See Chapter 6, the "Interpretation" chapter, for recommended restoration projects and their location.

4. "Restoration by definition is an act of restoring something back to a former condition. I do not see anything broken."

   All values, environmental, social, economic, spiritual, or otherwise, exist because someone cares about something. Problems arise only when values conflict with each other or with the inflexible realities of the bio-physical environment. The environmental complexities of the N. F. Alsea watershed mirror those of the entire Pacific Northwest. They arise both from the inherent constraints of the environment and from differing expectations among those who care about the area. The purpose of this watershed analysis is to investigate and document an ecological understanding of the terrestrial, aquatic and human attributes of the N. F. Alsea watershed, and its functions, processes, past conditions and future conditions. The analysis will identify data gaps, management opportunities, and if necessary restoration opportunities for the watershed.

5. " I can think of no area in this watershed which needs your interference."

   The watershed analysis process is not intended, nor will it be used to dictate, influence or judge management direction on *non-federal* owned lands. Watershed analysis has a critical role in providing for aquatic and riparian habitat protection. In planning for ecosystem management and establishing riparian reserves to protect and restore riparian and aquatic habitat and the overall watershed condition, the information from watershed analysis will be used to develop, prioritize for funding, and implement actions and projects on federal lands. The participation in the watershed analysis process by adjacent landowners and others is encouraged.

6. " I would like to see the restoration of the native run of steelhead above the N. F... fish hatchery."

   According to Bob Buckman, District Fish Biologist,, for the Oregon Department of Fish and Wildlife in Newport, Oregon, plans are being developed to restore the native run of steelhead above the N. F... Alsea fish hatchery. This will allow native steelhead access to approximately 1-2 miles of additional spawning habitat.

7. " Is there a problem with beaver? If so, let's trap them so water turbidity and streamside vegetation can be addressed."

   Beavers are prolific rodents which have cyclic population trends. We are unaware, at this time, of any problems with beavers on BLM-owned land within the watershed. However, beaver dams and ponds are considered beneficial in achieving desired water qualities, by trapping sediment and slowing the waters velocity and turbidity. Localized high density populations due occur occasionally, and in some instances, they can be detrimental to resources such as roads.

8. " Watershed don't need restoration."

   Current research shows that many runs of salmon are depressed or thought to be in danger of extinction. Recently the National Marine Fisheries Service proposed listing the coho salmon as Threatened under the Endangered Species Act. The Northwest Forest Plan directs the BLM and the USFS to conduct watershed analysis on federal lands as a basis for ecosystem planning and management. Watershed analysis focuses on implementing the Aquatic Conservation Strategy (part of the Northwest Forest Plan), and was developed to restore and maintain the ecological health of watershed and aquatic ecosystems on public lands. The strategy would protect salmon and steelhead habitat on federal lands managed by the BLM and U.S.F.S.

9. " Maintain an adequate vegetative buffer on all riparian areas."

   See response to comment number 7, section A.

“Place logs or boulders in fish bearing streams to create pools for young fish.”

The importance of large woody debris in creating fish habitat has been recognized since the mid-1980s (Bisson et al. 1987). Watershed analysis will precede restoration work, and an interdisciplinary team will determine actual management prescriptions to achieve quality habitat for fish.

“Place water bars on all skid roads, sow grass seed on all skid roads .”

The Salem District RMP directs us to apply best management practices (BMPs) during all ground and vegetation disturbing activities. For ground-based yarding, two of the BMPs are 1) tilling of compacted areas with a properly designed self-drafting sub-soiler, and 2) water barring of skid roads wherever surface erosion is likely. See Appendix C-2 of the RMP for additional BMPs.

“Ban any practices that will cause siltation or erosion.”

The Aquatic Conservation Strategy (ACS), part of the Northwest Forest Plan, was developed to restore and maintain the ecological health of the watersheds and aquatic ecosystems. The ACS employs several tactics that limit or exclude practices that cause excess siltation and erosion.

10. “Road rehabilitation or obliteration as needed.”

    Road closures are driven by objectives for the protection of resource values such as wildlife and water quality. If roads are to be retained for future management but closed to the public use, most closures would be accomplished by gates to allow access for maintenance. Transportation management objectives and watershed analysis will address road closure, renovation, obliteration and maintenance priorities.

11. “Stream side vegetation of a dense nature on all water sources.”

    See response to comment number 7, section A.

12. “The new Forest Practices laws are working fine. They go far enough to protect our forest land.”

    Oregon Forest Practices rules do not apply to federally managed lands. The BLM and the U.S.F.S. manage the BLM districts and national forests under congressional multiple-use and sustained-yield mandates. Major laws include the National Environmental Policy Act, Federal Land Policy Management Act, Oregon and California Lands Act, Endangered Species Act, Coastal Management Act, Executive Order 11990 (Protection of Wetlands), Clean Air Act, and Clean Water Act. It has been determined that the old-growth forest ecosystems and aquatic habitat of the Pacific Northwest are in a degraded condition, and aggressive restoration efforts are necessary to restore those ecosystems and their components.

13. “I am not certain that much watershed restoration is needed. After all, the coast range vegetation grows rapidly. Conversion of alder, maple and salmonberry riparian areas to cedar or fir would be helpful to fish habitat.”

The watershed analysis will help us determine how much restoration is needed and help us prioritize those efforts. Should the watershed analysis suggest that we convert riparian areas of alder, maple and salmonberry, activities which would enhance the development of conifers within riparian management areas would be encouraged.

14. " Stream bank erosion projects and erosion prevention on hillsides, leave more culls and debris after logging."

Watershed analysis will help us identify erosion problem areas and suggest ways that might mitigate those problems. The Salem District's RMP states that in regeneration cutting areas, a minimum of 240 linear feet of logs per acre, averaged over the area and reflecting the species mix of the original stand, will be left. All logs will be at least 20 inches in diameter and 20 feet in length.

ACRONYMS & ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
ACS	Aquatic Conservation Strategy
BE	biological evaluation
B. P.	before present
BLM	Bureau of Land Management
BMP	best management practices
CFS	cubic feet per second
CHU	critical habitat unit
CTS	Corvallis-to-the-Sea (Trail)
CWD	coarse woody debris
DBH	diameter at breast height
DEQ	Department of Environmental Quality (Oregon)
DO	dissolved oxygen
EEA	Environmental Education Area
EIS	Environmental Impact Statement [unless named document]
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FEMAT	Forest Ecosystem Management Assessment Team
FLPMA	Federal Land Policy and Management Act
FPA	Forest Practices Act (State of Oregon)
GFMA	General Forest Management Area
GIS	Geographic Information System
GLO	General Land Office
LSR	Late Successional Reserve
LWD	large woody debris
MM	marbled murrelet
NEPA	National Environmental Policy Act
NFP	Northwest Forest Plan
NRF	nesting, roosting, foraging
NSO	Northern spotted owl
NTU	nephelometric turbidity units
O&C	Oregon and California Act of 1937 (Revested Oregon and California Railroad Lands)
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ONA	Outstanding Natural Area
OHV	off-highway vehicle
RMP	Resource Management Plan for the Salem District
RNA	Research Natural Area
ROD	Record of Decision (ROD for Salem District RMP dated May, 1995)
RR	Riparian Reserves
SAS	Special Attention Species
SBA	Special Botanical Area
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SEIS	Supplemental Environmental Impact Statement
SFP	special forest products
S&G	standards and guidance
S&M	survey and manage
SNF	Siuslaw National Forest
T&E	threatened and endangered (species)
TMO	Transportation Management Objectives
TPCC	Timber Production Capability Classification System
TSZ	transient snow zone
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior USFS U.S. Forest Service

USFWS	U.S. Fish and Wildlife Service	USGS	U.S. Geological Survey